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TRANSACTIONS

OF THE

COLLEGE OF PHYSICIANS

OF

PHILADELPHIA

THIRD SERIES

VOLUME THE THIRTY-FIFTH

PHILADELPHIA
PRINTED FOR THE COLLEGE
1913

NOTICE

The present volume of Transactions contains the papers read before the College from January, 1913, to December, 1913, inclusive.

The Committee of Publication thinks it proper to say that the College holds itself in no way responsible for the statements, reasonings, or opinions set forth in the various papers published in its Transactions.

Edited by

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DORNAN, PRINTER

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1913

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[1] Died, March 29, 1913. [2] Elected Chairman, May 6, 1913. [3] Elected, June 4, 1913.

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[1] Died May 1, 1913.

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OF THE

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ELECTED	
1787	JOHN REDMAN
1805	WILLIAM SHIPPEN
1809	ADAM KUHN
1818	THOMAS PARKE
1835	THOMAS C. JAMES[1]
1835	THOMAS T. HEWSON
1848	GEORGE B. WOOD
1879	W. S. W. RUSCHENBERGER
1883	ALFRED STILLÉ
1884	SAMUEL LEWIS[2]
1884	J. M. DA COSTA
1886	S. WEIR MITCHELL
1889	D. HAYES AGNEW
1892	S. WEIR MITCHELL
1895	J. M. DA COSTA
1898	JOHN ASHHURST, JR.
1900	W. W. KEEN
1902	HORATIO C. WOOD
1904	ARTHUR V. MEIGS
1907	JAMES TYSON
1910	GEORGE E. DE SCHWEINITZ
1913	JAMES C. WILSON

[1] Died four months after his election.
[2] Resigned on account of ill-health.

FELLOWS

OF THE

COLLEGE OF PHYSICIANS OF PHILADELPHIA

DECEMBER, 1913

* Non-resident Fellows.
† Fellows who have commuted dues.

ELECTED

1892. Abbott, Alexander C., M.D., Sc.D. (Hon.), Professor of Hygiene and Bacteriology in the University of Pennsylvania; Member of the Board of Health of Philadelphia. 4229 Baltimore Ave.

1912. Addison, William H. F., A.B., M.B., Assistant Professor of Normal Histology and Embryology in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

1905. Adler, Lewis H., Jr., M.D., Professor of Diseases of the Rectum in the Philadelphia Polyclinic and College for Graduates in Medicine; formerly Prosector to the Professor of Anatomy in the University of Pennsylvania; Consulting Surgeon to the Charity Hospital; Secretary-Treasurer of the American Proctologic Society. 1610 Arch St.

1913. Alexander, Emory G., M.D., Surgeon to St. Christopher's Hospital for Children; Associate Surgeon to the Episcopal Hospital; Clinical Professor of Surgery in the Woman's Medical College of Pennsylvania, and Demonstrator of Fracture Dressings in the Jefferson Medical College; Assistant Surgeon to the Kensington Hospital for Women. 1627 Oxford St.

1903. Allen, Alfred Reginald, M.D., Lecturer on Neurological Electro-Therapeutics and Instructor in Neurology and Neuropathology in the University of Pennsylvania. 2013 Spruce St.

ELECTED

1906. Allen, Francis Olcott, Jr., A.B., M.D., Surgeon to the Dispensaries of the Presbyterian, Methodist, and Pennsylvania Hospitals. 2216 Walnut St.

1896. Allyn, Herman B., M.D., Associate in Medicine in the University of Pennsylvania; Physician to the Philadelphia General Hospital. 501 S. Forty-second St.

1888. Anders, James M., M.D., L.L.D., Professor of Medicine and Clinical Medicine in the Medico-Chirurgical College; Officer de l'Instruction Publique. 1605 Walnut St.

1905. Anspach, Brooke M., M.D., Associate in Gynecology in the University of Pennsylvania; Surgeon to the Gynecean Hospital; Gynecologist to the Philadelphia General and the Stetson Hospitals; Assistant Gynecologist to the University Hospital. 119 S. Twentieth St.

1905. Appleman, Leighton F., M.D., Demonstrator of Pharmacy and Materia Medica, and Instructor in Therapeutics in the Jefferson Medical College; Instructor in Ophthalmology in the Philadelphia Polyclinic and College for Graduates in Medicine; Ophthalmologist to the Frederick Douglass Memorial Hospital. 308 S. Sixteenth St.

1906. Ashhurst, Astley P. C., A.B., M.D., Instructor in Surgery in the University of Pennsylvania; Associate Surgeon and Orthopædist to the Episcopal Hospital; Assistant Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases. 811 Spruce St.

1893. Ashton, Thomas G., M.D., Physician to the Philadelphia General Hospital. 1814 S. Rittenhouse Square.

1906. Babbitt, James A., A.B., (Yale), A.M. (Haverford), M.D., Professor of Hygiene and Physical Education at Haverford College; Assistant Laryngologist and Aurist, and Chief of the Out-patient Department for Diseases of the Nose, Throat, and Ear at the German Hospital; Assistant Instructor in Otology in the University of Pennsylvania; Laryngologist to the Out-patient Department of the Children's Hospital. 1901 Chestnut St.

1903. Bacon, John, M.D. Torresdale, Pa.

1910. Baer, Benjamin F., Jr., M.D. 2040 Chestnut St.

†1892. Baker, George Fales, B.S., M.D. 1818 Spruce St.

1911. Baldwin, James Harvey, A.B., M.D., Assistant Surgeon to the Methodist Hospital. 1426 Pine St.

ELECTED

1889. Baldy, John Montgomery, M.D., Professor of Gynecology in the Philadelphia Polyclinic; Surgeon to the Gynecean Hospital; Consulting Surgeon to the Jewish and the Frederick Douglass Memorial Hospitals. 2219 De Lancey Place.

1898. Balliet, Tilghman M., A.M., M.D., Professor of Therapeutics at Dartmouth College, Hanover, N. H.; Physician to the Old Man's Home. 3709 Powelton Ave.

1911. Barnard, Everett P., M.D., Obstetrician to the Maternity Hospital; Assistant Instructor in Obstetrics in the University of Pennsylvania. 119 S. Nineteenth St.

1883. Baum, Charles, A.M., M.D., Ph.D. 1828 Wallace St.

1908. Beardsley, Edward J. G., M.D., L.R.C.P. (Lond)., Associate in Clinical Medicine in the Jefferson Medical College; Chief Clinical Assistant to the Out-Patient Medical Department of the Jefferson Medical College Hospital; Assistant Physician to the Philadelphia General Hospital. 2030 Chestnut St.

1883. Beates, Henry, Jr., M.S., Sc.D., M.D. 260 S. Sixteenth St.

*1874. Bennett, W. H., A.M., M.D., Physician-in-Charge of the Seashore House for Invalid Children, and of the Seaside House for Invalid Women, Atlantic City; formerly Physician to the Episcopal Hospital, and Physician-in-Charge of St. Christopher's Hospital for Children. Children's Seashore Home, Atlantic City, N. J.

1896. Beyea, Henry D., M.D., Associate in Gynecology and Assistant Demonstrator of Obstetrics in the University of Pennsylvania; Assistant Surgeon to the Gynecean Hospital. 1734 Spruce St.

†1884. Biddle, Alexander W., M.D. Chestnut Hill.

1884. Biddle, Thomas, M.D. 122 S. Twenty-second St.

*1903. Biggs, Montgomery H., M.D., Surgeon to the Rutherford Hospital; First Lieutenant, Medical Reserve Corps, U. S. Army; Member of the Tri-State Association of the Carolinas and Virginia; Member of the Southern Medical Association. Rutherfordton, N. C.

1908. Bland, Pascal Brooke, M.D., Chief Clinical Assistant in the Gynecological Department of the Jefferson Medical College Hospital; Instructor in Gynecology in the Jefferson Medical College; Gynecologist to St. Joseph's Hospital; Assistant Gynecologist to the Philadelphia General Hospital. 1621 Spruce St.

ELECTED

1894. Bochroch, Max H., M.D., Demonstrator of Neurology and Chief Clinical Assistant in the Nervous Department of the Jefferson Medical College Hospital; Neurologist to the Out-patient Department of St. Joseph's Hospital. 1539 Pine St.

1896. Boger, John A., A.M., M.D., Surgeon to St. Mary's Hospital; Surgeon to the Stetson Hospital; Surgeon to the Dispensary of the Episcopal Hospital. 2213 N. Broad St.

1910. Boice, J. Morton, A.B., M.D., Gynecologist to the Out-patient Department of St. Joseph's Hospital; Lecturer on Chemistry to the Training School of St. Joseph's Hospital. 4020 Spruce St.

1911. Bonney, Charles W., A.B., M.D., Assistant Demonstrator of Anatomy in the Jefferson Medical College; Assistant Surgeon, Department of Oral Surgery, Philadelphia General Hospital. 1117 Spruce St.

1913. Boston, L. Napoleon, A.M., M.D., Professor of Physical Diagnosis in the Medico-Chirurgical College; Physician to the Philadelphia General Hospital; Pathologist to the Frankford Hospital. 1819 Chestnut St.

1891. Boyd, George M., M.D., Professor of Obstetrics in the Medico-Chirurgical College; Obstetrician to the Medico-Chirurgical Hospital; Physician to the Philadelphia Lying-in Charity; Obstetrician and Gynecologist to the Philadelphia General Hospital. 1909 Spruce St.

1907. Boyer, Henry Percival, M.D., Physician to the Stetson Hospital; Assistant Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases. 4602 Baltimore Ave.

†1884. Bradford, T. Hewson, M.D., Medical Director of the Philadelphia Life Insurance Company; Medical Director of the United Security Life Insurance and Trust Company. 1802 De Lancey Place.

1907. Bradley, William N., Ph.G., M.D., Physician to the Out-patient Department of the Children's Hospital; Assistant Physician to the Out-patient Department of the Pennsylvania Hospital; Physician to the Dispensaries of the Starr Centre. 1638 S. Broad St.

1903. Branson, Thomas F., M.D., Attending Physician to the Bryn Mawr Hospital. Rosemont, Pa.

1891. Brinton, Lewis, M.D., Physician-in-Chief to the American Hospital for Diseases of the Stomach. 1933 Spruce St.

ELECTED

1900. Brinton, Ward, A.M., M.D., Visiting Physician to the Tuberculosis Department of the Philadelphia General Hospital; Visiting Physician to the Hospital for Poor Consumptives at White Haven, Pa.; Visiting Physician to the Philadelphia Jewish Sanatorium for Consumptives; Member of the Board of Inspectors of the Philadelphia County Prison. 1423 Spruce St.

1907. Brooks, Macy, A.B. (Princeton), M.D., Assistant Genito-urinary Surgeon to the Philadelphia General Hospital. 1314 Spruce St.

1887. Brubaker, Albert P., A.M., M.D., Professor of Physiology and Medical Jurisprudence in the Jefferson Medical College; Professor of Physiology and Hygiene in the Drexel Institute of Science, Art, and Industry. 105 N. Thirty-fourth St.

1851. Bullock, William R., M.D. 6439 Greene St., Germantown.

1906. Burns, Stillwell C., M.D., Lecturer on Surgery in the Medico-Chirurgical College; Assistant Surgeon to the Medico-Chirurgical Hospital. 1326 Spring Garden St.

1892. Burr, Charles W., M.D., Professor of Mental Diseases in the University of Pennsylvania; Neurologist to the Philadelphia General Hospital. 1918 Spruce St.

1906. Butler, Ralph, M.D., Professor of Diseases of the Nose and Throat in the Philadelphia Polyclinic and the College for Graduates in Medicine; Chief of the Dispensary for Diseases of the Ear at the University Hospital; Instructor in Otology in the University of Pennsylvania; Laryngologist and Aurist to the German Hospital. 1824 Chestnut St.

1912. Butt, William Redfield, M.D., Assistant Laryngologist to the Out-Patient Department of the German Hospital; Chief of the Out-Patient Department for Diseases of the Ear, Nose, and Throat of the Howard Hospital; Demonstrator of Operative Rhinology in the Philadelphia Polyclinic. 1701 Chestnut St.

*1908. Cadbury, William W., A.M., M.D., University Medical School, Canton, China.

†1907. Cadwalader, Williams B., M.D., Pathologist and Clinical Assistant to the Orthopædic Hospital and Infirmary for Nervous Diseases; Assistant Instructor in Nervous Diseases in the Philadelphia Polyclinic. 1710 Locust St.

ELECTED

1905. Cameron, George A., M.D., Physician to the Germantown Hospital. S. E. cor. Schoolhouse Lane and Greene St., Germantown.

1905. Carmany, Harry S., M.D., Surgeon to St. Timothy's Hospital, Roxborough; Surgeon to the Dispensary of the Episcopal Hospital. 366 Green Lane, Roxborough.

1910. Carnett, John Berton, M.D., Associate in Surgery in the University of Pennsylvania; Assistant Surgeon to the University and the Philadelphia General Hospitals; Surgeon to the Chestnut Hill Hospital; Consulting Surgeon to the Henry Phipps Institute, to the Phœnixville Hospital, and to the Eastern Pennsylvania Institution for the Feeble-minded and Epileptic. 123 S. Twentieth Street.

1905. Carpenter, Herbert B., M.D., Physician to the Dispensary of the Children's Hospital. 1805 Spruce St.

1895. Carpenter, John T., M.D., Lecturer on Ophthalmology in the University of Pennsylvania; Assistant Ophthalmic Surgeon to the University Hospital; Attending Ophthalmologist to the Bryn Mawr Hospital. 2040 Chestnut St.

1892. Cattell, Henry W., A.M., M.D., Editor of *International Clinics*, of *Medical Notes and Queries*, and of *Lippincott's Medical Dictionary;* Author of *Postmortem Pathology.* 3709 Spruce St.

1900. Chance, Burton, M.D., Assistant Surgeon to the Wills Eye Hospital; Ophthalmic Surgeon to the Pennsylvania Railroad Company. 235 S. Thirteenth St.

*1868. Cheston, D. Murray, M.D. Harwood P. O., Md.

1897. Cheston, Radcliffe, M.D., Visiting Physician to the Chestnut Hill Hospital; Consulting Physician to the Germantown Hospital, and to the Pennsylvania Institution for the Deaf and Dumb. Chestnut Hill.

1904. Christian, Hilary M., M.D., Clinical Professor of Genito-urinary Diseases in the Medico-Chirurgical College. 1321 Spruce St.

1903. Chrystie, Walter, M.D. Bryn Mawr, Pa.

1899. Clark, John G., M.D., Professor of Gynecology in the University of Pennsylvania; Gynecologist-in-Chief to the University Hospital. 2017 Walnut St.

1897. Claxton, Charles, A.M., M.D. 5137 Morris St., Germantown.

ELECTED

1896. Cleveland, Arthur H., M.D., Clinical Professor of Laryngology in the Medico-Chirurgical College; Laryngologist to the Medico-Chirurgical Hospital; Laryngologist and Aurist to the Presbyterian Hospital, and to Pennsylvania Institution for Deaf and Dumb. 256 S. Fifteenth St.

1910. Cloud, J. Howard, M.D., Assistant Physician to the Bryn Mawr Hospital; Attending Physician to the Children's House of Bryn Mawr Hospital. 7 W. Lancaster Ave., Ardmore, Pa.

1903. Coates, George Morrison, A.B., M.D., Surgeon to the Out-Patient Department for Diseases of the Ear, Throat, and Nose of the Pennyslvania Hospital; Professor of Diseases of the Ear in the Philadelphia Polyclinic; Laryngologist to the Tuberculosis Department of the Philadelphia General Hospital; Consulting Laryngologist to the Philadelphia Orphanage. 2032 Chestnut St.

1908. Codman, Charles A. E., M.D., Physician to the American Oncologic Hospital. 4116 Spruce St.

1907. Cohen, Myer Solis, A.B., M.D., Pediatrist to the Jewish Hospital, and to the Philadelphia Jewish Sanatorium for Consumptives, Eagleville, Pa.; Assistant Visiting Physician to the Philadelphia General Hospital; Consulting Physician to the Home for Consumptives, Chestnut Hill. 4102 Girard Ave.

1888. Cohen, Solomon Solis, M.D., Professor of Clinical Medicine in the Jefferson Medical College; Physician to the Jefferson Medical College Hospital, to the Philadelphia General Hospital, to the Jewish Hospital, and to the Rush Hospital. 1525 Walnut St.

1898. Coles, Stricker, M.D., Assistant Professor of Obstetrics in the Jefferson Medical College; Assistant Obstetrician to the Jefferson and the Philadelphia General Hospitals; Visiting Physician to the Philadelphia Lying-in-Charity Hospital. 2103 Walnut St.

1901. Coley, Thomas Luther, A.B., M.D., Attending Physician Methodist Episcopal Hospital, Philadelphia. 256 S. Fifteenth St.

1903. Coplin, W. M. L., M.D., Professor of Pathology in the Jefferson Medical College; Pathologist to and Director of the Laboratories of the Jefferson Medical College Hospital; Pathologist to the Philadelphia General Hospital and to the Friends' Asylum for the Insane, Frankford; Bacteriologist to the Pennsylvania State Board of Health. 606 S. Forty-eighth St.

ELECTED

1912. Copp, Owen, A.B., M.D., Physician-in-chief and Superintendent of the Pennsylvania Hospital for the Insane. Pennsylvania Hospital for the Insane. Forty-fourth and Market Sts.

1911. Cornell, Walter Stewart, A.B., M.D., Director of Medical Inspection of Public Schools of the City of Philadelphia; Chief of Medical Staff of the House of Detention; Lecturer on Osteology in the University of Pennsylvania; Lieutenant, Medical Reserve Corps, U. S. A. 729 City Hall.

1907. Council, Malcolm S., M.D., Attending Physician to the Bryn Mawr Hospital; Attending Physician to the Cathcart Home at Devon. Bryn Mawr, Pa.

*1909. Craig, Alexander R., A.M., M.D., Secretary of the American Medical Association. 535 N. Dearborn St., Chicago, Ill.

1904. Craig, Frank A., M.D., Instructor in Medicine in the University of Pennsylvania; Visiting Physician to the Henry Phipps Institute, University of Pennsylvania; Visiting Physician to the White Haven Sanatorium; Physcian-in-Charge of the Tuberculosis Class of the Presbyterian Hospital. 2030 Chestnut St.

1907. Crampton, George S., M.D. 1700 Walnut St.

1904. Cruice, John M., M.D., Instructor in Medicine in the University of Pennsylvania; Assistant Physician to the Philadelphia General Hospital; Physician to the Medical Dispensary of the University Hospital and of St. Joseph's Hospital. 1815 Spruce St.

*1910. Cummins, W. Taylor, M.D., Pathologist to the Southern Pacific Hospital; Director of the Mary W. Harriman Research Laboratory, San Francisco, Cal.

1902. Currie, Charles A., M.D., Physician to the Germantown Hospital. West Walnut Lane, Germantown.

1903. Da Costa, John C., Jr., M.D., Associate Professor of Medicine in the Jefferson Medical College; Assistant Physician to the Jefferson Medical College Hospital; Hematologist to the German Hospital; Consulting Physician to the Northwestern General Hospital. 264 S. Fifteenth St.

1896. Da Costa, John Chalmers, M.D., Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Surgeon to the Philadelphia General and St. Joseph's Hospitals. 2045 Walnut St.

1887. Daland, Judson, M.D., Professor of Clinical Medicine in the Medico-Chirurgical College; Physician to the Medico-Chirurgical Hospital. 317 S. Eighteenth St.

ELECTED

1859. Darrach, James, M.D., Consulting Surgeon to the Germantown Hospital. 5923 Greene St., Germantown.

1896. Davis, Charles N., M.D., Dermatologist to the Pennsylvania Hospital; Consulting Dermatologist to St. Agnes' Hospital; Assistant Physician to the Dispensary for Skin Diseases in the Howard Hospital. 1931 Spruce St.

1888. Davis, Edward P., A.M., M.D., Professor of Obstetrics in the Jefferson Medical College and in the Philadelphia Polyclinic; Visiting Obstetrician to the Jefferson and the Polyclinic Hospitals; Obstetrician and Gynecologist to the Philadelphia General Hospital; Member of the American Gynecological Society, the American Pediatric Society, and of the International Congress of Obstetrics and Gynecology. 250 S. Twenty-first St.

1889. Davis, Gwilym G., M.D. (Univ. of Penna. and Göttingen), LL.D., M.R.C.S. Eng., Professor of Orthopedic Surgery in the University of Pennsylvania; Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases; Orthopedic Surgeon to the Philadelphia General Hospital; Consulting Surgeon to St. Joseph's Hospital. 1814 Spruce St.

1900. Davisson, Alex. Heron, M.D. 31 St. Paul's Rd., Ardmore.

1894. Deaver, Harry C., M.D., Professor of Surgery in the Woman's Medical College of Pennsylvania; Surgeon to the Episcopal Hospital, and to the Children's Hospital of the Mary J. Drexel Home; Surgeon-in-Chief to the Kensington Hospital for Women. 1534 N. Fifteenth St.

1887. Deaver, John B., M.D., D.Sc., LL.D., Professor of the Practice of Surgery in the University of Pennsylvania; Surgeon-in-Chief to the German Hospital. 1634 Walnut St.

1902. Dehoney, Howard, M.D. 237 S. Thirteenth St.

1885. Dercum, Francis X., A.M., M.D., Ph.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College; Consulting Neurologist to the Philadelphia General Hospital; Foreign Corresponding Member of the Neurological Society of Paris, and Corresponding Member of the Psychiatric and Neurological Society of Vienna. 1719 Walnut St.

1908. Despard, Duncan L., M.D., Instructor in Surgery in Jefferson Medical College; Chief Assistant in the Surgical Clinic at Jefferson Medical College Hospital. 1806 Pine St.

1912. Dewey, J. Hiland, Ph.B., M.D., Assistant Surgeon to Wills Eye Hospital; Ophthalmic Surgeon to St. Francis' Hospital, Trenton, N. J. 1436 Diamond St.

ELECTED

1911. Dickson, Frank D., M.D., Instructor in Orthopedic Surgery in the University of Pennsylvania; Assistant Orthopedic Surgeon to the University Hospital; Assistant Surgeon to the Orthopædic Hospital; Assistant Orthopedic Surgeon to the Philadelphia General Hospital. 1814 Spruce St.

1908. Dillard, Henry K., Jr., M.D., Physician to the Out-Patient Department of the Pennsylvania Hospital; Physician to the Dispensary of the Mary J. Drexel Home. 234 S. Twentieth St.

1891. Dixon, Samuel G., M.D., LL.D., Commissioner of Health of Pennsylvania; President of the Academy of Natural Sciences of Philadelphia; Member of the Philadelphia Bar. Bryn Mawr, Pa.

*1897. Dorland, W. A. Newman, M.D., Professor of Gynecology in the Post-graduate Medical School of Chicago; Professor of Obstetrics in the Medical Department of Loyola University; Visiting Obstetrician to Cook County Hospital; Fellow of the American College of Surgeons; First Lieutenant, Medical Reserve Corps, U. A. Army. 1422 W. Jackson Boulevard, Chicago, Ill.

1907. Dorrance, George Morris, M.D., Surgeon to St. Agnes' Hospital; Demonstrator of Applied Anatomy in the Dental Department of the University of Pennsylvania. 2025 Walnut St.

1902. Dougherty, Sherborne W., M.D., Instructor in Physical Diagnosis in the University of Pennsylvania; Physician to the Dispensary of the German Hospital; Assistant Physician to the Methodist Hospital. 256 S. Sixteenth St.

1893. Downs, Norton, M.D., Fordhooke Farms, Three Tuns, Pa.

1864. Downs, R. N., M.D., Consulting Physician to the Germantown Hospital. 5916 Greene St., Germantown.

1902. Downs, Robert N., Jr., M.D., Surgeon to the Dispensary of the Germantown Hospital. 6008 Greene St., Germantown.

1910. Drayton, William, Jr., M.D., Assistant Physician to the Out-patient Department of the Pennsylvania Hospital; Clinical Assistant at the Orthopædic Hospital and Infirmary for Nervous Diseases; Physician to St. Michael's Parish School. 1316 Locust St.

1864. Duer, Edward L., A.M., M.D., Gynecologist to the Presbyterian Hospital; Consulting Obstetrician to the Maternity Hospital and the Preston Retreat. 1606 Locust St.

ELECTED

1881. Dulles, Charles Winslow, M.D., Consulting Surgeon of the Rush Hospital. 4101 Walnut St.

1911. Earnshaw, Henry Culp, M.S., M.D., Attending Physician to the Hospital of the Good Shepherd, Rosemont; Assistant Attending Physician to the Bryn Mawr Hospital; Attending Physician to the Bryn Mawr Children's Hospital; Pennsylvania Railroad Surgeon. Bryn Mawr, Pa.

*1899. Edsall, David L., M.D., Jackson Professor of Clinical Medicine in the Medical School of Harvard University; Chief of Service, Medical Department of the Massachusetts General Hospital. 80 Marlborough St., Boston, Mass.

*1887. Edwards, William A., M.D., Professor of Pediatrics in the Medical Department of the University of California. Fifth and Spring Sts., Los Angeles, Cal.

1911. Eliason, Eldridge E., B.A., M.D., Assistant Instructor in Surgery in the University of Pennsylvania; Assistant Surgeon to the University Hospital; Assistant Surgeon to the Howard Hospital; Surgeon to the Out-patient Department of the Children's Hospital. 320 S. Sixteenth St.

1904. Elmer, Walter G., B.S., M.D., Instructor in Orthopedic Surgery in the University of Pennsylvania; Assistant Orthopedic Surgeon to the University Hospital; Orthopedic Surgeon to the Jewish Hospital; Surgeon to the Pennsylvania Training School for Children. 1801 Pine Street.

1896. Ely, Thomas C., A.M., M.D. 2041 Green St.

1901. Erck, Theodore A., M.D., Associate in Gynecology in the Philadelphia Polyclinic and College for Graduates in Medicine; Associate Surgeon to the Gynecean Hospital. 251 S. Thirteenth St.

1893. Eshner, Augustus A., M.D., Professor of Clinical Medicine in the Philadelphia Polyclinic and College for Graduates in Medicine; Physician to the Philadelphia General Hospital; Assistant Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Consulting Physician to Mercy Hospital. 1019 Spruce St.

*1905. Evans, Joseph S., Jr., A.B., M.D., Professor of Clinical Medicine and Students' Physician in the University of Wisconsin. University of Wisconsin, Madison, Wis.

1905. Evans, William, M.D. 4007 Chestnut St.

ELECTED

1912. Eves, Curtis C., M.D., Aural and Laryngeal Surgeon to the Episcopal Hospital; Assistant in the Out-patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Demonstrator of Operative Surgery of the Ear, Nose, and Throat in the Philadelphia Polyclinic. 302 S. Nineteenth St.

1894. Faries, Randolph, M.D. 2007 Walnut St.

†1903. Farr, Clifford B., A.B., M.D., Professor of Diseases of the Stomach, etc., in the Philadelphia Polyclinic; Instructor in Medicine in the University of Pennsylvania; Assistant Physician to the Philadelphia General Hospital; Pathologist to the Presbyterian Hospital. 117 S. Twenty-second St.

1893. Farr, William W., M.D., Physician to the Leamy Home. Springfield Ave. and Lincoln Drive, Chestnut Hill.

1884. Fenton, Thomas H., M.D., Ophthalmologist to St. Vincent's Home, to the Home for Aged Couples, to the Baptist Home, and to the House of the Good Shepherd. 1319 Spruce St.

1907. Ferguson, Albert D., M.D., Visiting Physician to the Widener Memorial School for Crippled Children. 50 E. Johnson St., Germantown.

1907. Fetterolf, George, A.B., M.D., Sc.D., Laryngologist to the Henry Phipps Institute for Tuberculosis; Laryngologist to the White Haven Sanatorium; Consulting Laryngologist to the Phœnixville Hospital; Demonstrator of Anatomy in the University of Pennsylvania. 330 S. Sixteenth St.

1907. Fife, Charles A., A.B., M.D., Instructor in Diseases of Children, and Associate in the William Pepper Clinical Laboratory in the University of Pennsylvania; Physician to St. Christopher's Hospital for Children, to the Children's Department of the Presbyterian Hospital, and to the Children's Department of the Mary J. Drexel Home; Assistant Pediatrist to the Philadelphia General Hospital; Visiting Physician to St. Vincent's Home. 2033 Locust St.

1884. Fisher, Henry M., M.D. 1027 Pine St.

1910. Fisher, John Monroe, M.D., Associate Professor of Gynecology in the Jefferson Medical College; Gynecologist to the Philadelphia, St. Agnes', and Phœnixville Hospitals; Assistant Gynecologist to the Jefferson Medical College Hospital. 222 S. Fifteenth St.

ELECTED

1888. Flick, Lawrence F., M.D. 736 Pine St.

1908. Foulkrod, Collin, M.D., Obstetrician to the Maternity House of the Presbyterian Hospital; Assistant Demonstrator of Obstetrics in Jefferson Medical College; Gynecologist to the Dispensary of the Presbyterian Hospital. 4005 Chestnut St.

1908. Fox, Herbert, M.D., Director of the William Pepper Laboratory of Clinical Medicine, University of Pennsylvania; Pathologist to the Laboratory of Comparative Pathology of the Zoölogical Society of Philadelphia; Pathologist to the Rush Hospital. 3902 Locust St.

†1885. Fox, Joseph M., M.D. Torresdale, Pa.

1906. Fraley, Frederick, Jr., A.B., M.D. 1701 De Lancey Place.

1903. Francine, Albert Philip, A.M., M.D., Associate in Medicine in the University of Pennsylvania; Visiting Physician to the Philadelphia General Hospital, Department of Tuberculosis; Physician-in-Chief to the State Dispensary for Tuberculosis, Philadelphia. 1932 Spruce St.

1897. Frazier, Charles H., M.D., Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, the Philadelphia General, and the Episcopal Hospitals; Surgeon to the Home for Crippled Children. 1724 Spruce St.

†1890. Freeman, Walter J., M.D., Emeritus Professor of Laryngology in the Philadelphia Polyclinic; Laryngologist to the Orthopædic Hospital; Consulting Laryngologist to the Pennsylvania Institution for the Deaf and Dumb. 1832 Spruce St.

1910. Frescoln, Leonard D., A.B., M.D., District Police Surgeon and out-door Physician; Assistant in the Surgical Dispensary of the Polyclinic Hospital; Assistant Physician to the Dispensary for Skin Diseases of the University Hospital, and to the Rush Hospital; Registrar to the Philadelphia General Hospital. 3944 Aspen St.

1910. Furbush, Charles Lincoln, M.D. 1501 Spruce St.

1889. Fussell, M. Howard, M.D., Professor of Applied Therapeutics in the University of Pennsylvania; Physician to the University Hospital, the Episcopal Hospital, St. Timothy's Hospital, and St. Mary's Hospital. 2035 Walnut St.; 421 Lyceum Ave., Roxborough.

ELECTED

1899. Gamble, Robert G., M.D., one of the Attending Physicians to the Bryn Mawr Hospital. Haverford, Pa.

1912. Gaskill, Henry Kennedy, M.D., Associate in Dermatology to the Jefferson Medical College; Assistant Dermatologist to the Philadelphia General Hospital. 1610 Spruce St.

1873. Gerhard, George S., M.D., Physician-in-Chief to the Bryn Mawr Hospital; Consulting Physician to Bryn Mawr College; Consulting Physician to Villa Nova College. Fifty-eighth Street and Overbrook Ave.

1902. Ghriskey, Albert A., M.D. 3936 Walnut St.

1892. Gibb, Joseph S., M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic. 1907 Chestnut St.

1899. Gibbon, John H., M.D., Professor of Surgery in the Jefferson Medical College; Surgeon to the Pennsylvania and the Bryn Mawr Hospitals. 1608 Spruce St.

1908. Gildersleeve, Nathaniel, M.D., Associate in Bacteriology in the University of Pennsylvania; Pathologist to the Bar Harbor Medical and Surgical Hospital, Bar Harbor, Me. Dormitories, University of Pennsylvania.

1913. Ginsburg, Nathaniel, M.D., Surgeon to the Jewish Hospital; Associate in Surgery in the Philadelphia Polyclinic and College for graduates in Medicine; Assistant Surgeon to Mt. Sinai Hospital; Instructor in Anatomy in the University of Pennsylvania. 1704 Pine St.

1897. Girvin, John H., M.D., Physician for Diseases of Women at the Presbyterian Hospital; Instructor in Obstetrics in the University of Pennsylvania. 2120 Walnut St.

1889. Githens, William H. H., M.D., Weightman Bldg., 1524 Chestnut St.

1906. Gittings, J. Claxton, M.D., Instructor in Pediatrics in the University of Pennsylvania; Assistant Pediatric Physician to the University Hospital; Visiting Physician to the Children's Hospital of the Mary J. Drexel Home, and to the Out-patient Department of the Presbyterian Hospital. 3942 Chestnut St.

1905. Given, Ellis E. W., M.D., Surgeon to the Dispensary of the Episcopal Hospital. 2714 Columbia Avenue.

1894. Gleason, E. B., S.B., M.D., LL.D., Professor of Otology in the Medico-Chirurgical College. 2033 Chestnut St.

ELECTED

1906. Goepp, R. Max, M.D., Professor of Clinical Medicine, Dean of the College Department, and Secretary of the Faculty of the Philadelphia Polyclinic and College for Graduates in Medicine; Assistant Professor of Clinical Medicine in the Jefferson Medical College; Assistant Visiting Physician to the Philadelphia General Hospital. 1716 Locust St.

1906. Goldberg, Harold G., M.D., Curator and Pathologist to the Wills Eye Hospital; Assistant Ophthalmic Surgeon to the Episcopal Hospital; Secretary of the Board of Trustees, House of St. Michael and All Angels; First Lieutenant, Medical Reserve Corps, U. S. Army. 1925 Chestnut St.

1893. Goodell, W. Constantine, M.D. 300 S. Thirteenth St.

1908. Goodman, Edward H., M.D., Associate in Medicine in the University of Pennsylvania; Consultant to the Medical Dispensary of the University Hospital; Assistant Physician to the University Hospital; Assistant Physician to the Philadelphia General Hospital. 248 S. Twenty-first St.

1905. Gordon, Alfred, M.D., Neurologist to the Mt. Sinai, the Northwestern General, and the Douglass Memorial Hospitals. 1812 Spruce. St.

†1897. Gould, George M., A.M., M.D. 401 Oriental Ave., Atlantic City, N. J.

1894. Graham, Edwin E., M.D., Professor of Pediatrics in the Jefferson Medical College; Pediatrist to the Jefferson and the Philadelphia General Hospitals; Physician to the Franklin Reformatory Home. 1713 Spruce St.

1885. Graham, John, M.D. 326 S. Fifteenth St.

1904. Grayson, Charles P., M.D., Professor of Laryngology and Rhinology in the University of Pennsylvania; Physician-in-Charge of the Throat and Nose Department of the University Hospital; Otolaryngologist to the Philadelphia General Hospital. 1435 Spruce St.

1910. Greenman, Milton J., M.D., Sc.D., Director of the Wistar Institute of Anatomy and Biology. Wistar Institute of Anatomy and Biology, Thirty-sixth St. and Woodland Ave.

1883. Griffith, J. P. Crozer, M.D., Professor of Diseases of Children in the University of Pennsylvania; Corresponding Member of the Société de Pédiatrie de Paris; Member of the American Pediatric Society and of the Association of American Physicians. 1810 Spruce St.

ELECTED

1912. Griscom, J. Milton, B.S., M.D., Assistant Surgeon to the Wills Eye Hospital; Chief of Clinic of the Eye Dispensary of the Presbyterian Hospital. 1925 Chestnut St.

1911. Gummey, Frank Bird, M.D., Visiting Physician to the Germantown Hospital and Dispensary; Visiting Physician to the Midnight Mission. 5418 Greene St., Germantown.

1902. Gwyn, Norman B., M.D., Instructor in Medicine in the University of Pennsylvania. 20 S. Twenty-first St.

1894. Hamill, Samuel McC., M.D., Professor of Diseases of Children in the Philadelphia Polyclinic and College for Graduates in Medicine; Pediatrist to the Presbyterian Hospital; Pediatrist to St. Vincent's Home. 1822 Spruce St.

1897. Hand, Alfred, Jr., M.D., Visiting Physician to the Children's Hospital, to the Children's Hospital of the Mary J. Drexel Home, and to the Methodist Hospital. 1724 Pine St.

1886. Hansell, Howard F., M.D., Professor of Ophthalmology in the Jefferson Medical College; Ophthalmic Surgeon to the Philadelphia General Hospital and to the Jefferson Medical College Hospital; Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic. 1528 Walnut St.

1889. Hare, Hobart A., M.D., Professor of Therapeutics, Materia Medica, and Diagnosis in the Jefferson College, 1801 Spruce St.

1903. Hart, Charles D., M.A., M.D., Physician to the Outpatient Department of the Pennsylvania Hospital; Inspector of the Eastern Penitentiary. 1317 Walnut St.

1885. Harte, Richard H., M.D., Adjunct Professor of Surgery in the University of Pennsylvania; Surgeon to the Pennsylvania and the Orthopædic Hospitals; Consulting Surgeon to St. Mary's, St. Timothy's, and the Bryn Mawr Hospitals. 1503 Spruce St.

1888. Hartzell, Milton B., M.D., LL.D., Professor of Dermatology in the University of Pennsylvania; Clinical Professor of Dermatology in the Woman's Medical College of Pennsylvania. 3644 Chestnut St.

1907. Hatfield, Charles James, A.B. (Princeton), M.D., Executive Director of the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis; Visiting Physician to the White Haven Sanatorium. 2008 Walnut Street.

ELECTED

1872. Hays, I. Minis, M.D. 266 S. Twenty-first St.

1911. Heed, Charles R., M.D., Associate in Ophthalmology in the Philadelphia Polyclinic; Assistant Surgeon to the Wills Eye Hospital; Instructor in Ophthalmology in the Jefferson Medical College. 1700 Walnut St.

1908. Heineberg, Alfred, M.D., Associate in Gynecology in the Jefferson Medical College; Assistant Gynecologist to St. Agnes' and to Mt. Sinai Hospitals. 1642 Pine St.

1901. Heisler, John C., M.D., Professor of Anatomy in the Medico-Chirurgical College. 3829 Walnut St.

1884. Henry, Frederick P., A.M., M.D., Professor of the Principles and Practice of Medicine in the Woman's Medical College of Pennsylvania; Physician to the Philadelphia General Hospital; Corresponding Member of the Royal Academy of Medicine of Rome. 114 S. Eighteenth St.

1903. Henry, J. Norman, M.D., Physician to the Pennsylvania Hospital; Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania; Assistant Physician to the Philadelphia General Hospital. 1906 Spruce St.

1891. Hewson, Addinell, A.M., M.D., Professor of Anatomy in the Philadelphia Polyclinic and College for Graduates in Medicine; Surgeon to St. Timothy's Hospital, Roxborough. 2120 Spruce St.

1909. Higbee, William S., M.D., President of the Pennsylvania State Board of Examiners for Registration of Nurses. 1703 S. Broad St.

1910. Hill, Howard Kennedy, M.D., Assistant Instructor in Medicine in the University of Pennsylvania; Physician to the Children's Medical Dispensary of the Presbyterian Hospital; Visiting Physician to the University Settlement, and to the Day Nursery; Assistant Physician to the Medical Dispensary of the Children's Hospital. 339 S. Eighteenth St.

1897. Hinkle, William M., M.D., Lecturer on the Anatomy and Physiology of the Vocal Organs in the National School of Elocution and Oratory. 1323 N. Thirteenth St.

*1892. Hinsdale, Guy, A.M., M.D., Secretary of the American Climatological Association; Fellow of the Royal Society of Medicine, Great Britain; Fellow of the American Academy of Medicine; Lecturer on Climatology in the Medico-Chirurgical College, Philadelphia. Hot Springs, Virginia.

1888. Hirsh, A. Bern, M.D., Physician to the Home for Aged Couples; Editor of the *Weekly Roster*. 22 S. Twenty-first St.

ELECTED

1888. Hirst, Barton Cooke, M.D., Professor of Obstetrics in the University of Pennsylvania; Gynecologist to the Philadelphia General and the Howard Hospitals. 1821 Spruce Street.

1903. Hirst, John Cooke, M.D., Assistant Obstetrician to the University and the Philadelphia General Hospitals; Attending Physician to the Maternity Hospital and to the Gynecological Dispensary of the Howard Hospital; Consulting Obstetrician to the Southeastern Dispensary. 1823 Pine St.

1908. Hitchens, Arthur Parker, M.D., Secretary-Treasurer of the Society of American Bacteriologists; Chairman of the Council of the American Association of Immunologists. Glenolden, Pa.

1905. Hodge, Edward B., M.D., Surgeon to the Presbyterian and the Children's Hospitals; Surgeon to the Out-patient Department of the Pennsylvania Hospital; Surgeon to the Widener School, 346 S. Sixteenth St.

1913. Hoffman, Clarence, M.D., 425 S. Carlisle St.

1885. Holland, James W., A.M., M.D., Sc.D., Emeritus Professor of Medical Chemistry and Toxicology and Dean of the Jefferson Medical College. 2006 Chestnut St.

1906. Holloway, Thomas B., M.D., Instructor in Ophthalmology in the University of Pennsylvania; Assistant Ophthalmologist to the Orthopædic Hospital and Infirmary for Nervous Diseases; Ophthalmologist to the Pennsylvania Institution for the Instruction of the Blind; Consulting Ophthalmologist to the Henry Phipps Institute. 1819 Chestnut St.

1908. Hoyt, Daniel M., M.D., Assistant Visiting Physician to the Philadelphia General Hospital. 3604 Chestnut St.

*1912. Huber, G. Carl, M.D., Professor of Histology and Embryology, and Director of the Histological Laboratory in the University of Michigan; Sometime Professor of Embryology in the Wistar Institute of Anatomy, Philadelphia; Secretary-Treasurer of the American Association of Anatomists. 1330 Hill St., Ann Arbor, Mich.

1892. Hughes, William E., M.D., Visiting Physician to the Philadelphia General Hospital; Pathologist to the Presbyterian Hospital. 3945 Chestnut St.

1912. Hunter, John W., B.S., M.D. 2042 Pine St.

ELECTED

1898. Hutchinson, James P., M.D., Surgeon to the Pennsylvania, the Methodist, the Children's, St. Timothy's, and the Bryn Mawr Hospitals; Adjunct Professor of Surgery in the University of Pennsylvania. 133 S. Twenty-second Street.

1871. Ingham, James V., M.D. 1811 Walnut St.

*1885. Jackson, Edward, M.D., Professor of Ophthalmology in the University of Colorado; Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic; Ophthalmologist to the Denver City and County Hospital. 318 Majestic Building, Denver, Col.

1906. Jacobs, Francis Brinton, B.S., M.D., Pediatrist to the Howard Hospital; Pediatrist to the American Hospital for Diseases of the Stomach; Visiting Physician to the Philadelphia Orphan Asylum; Assistant in the Laboratory of the Polyclinic Hospital. 2032 Chestnut St.

1913. Jefferys, William Hamilton, A.B., A.M., M.D., Surgeon to St. Luke's Hospital, Shanghai; Professor of Surgery in St. John's University, Shanghai; Editor of the China Medical Journal; Member of Executive and Research Committees of the China Medical Missionaries Association. Wissahickon Ave. above Manheim St. Germantown.

1898. Johnson, Russell H., A.B. (Princeton), M.D., Physician to the Pennsylvania Institution for the Deaf and Dumb. Chestnut Hill, Philadelphia.

1900. Jones, Charles James, A.M., M.D., Ophthalmic Surgeon to St. Joseph's Hospital; Ophthalmic Surgeon to the House of the Good Shepherd, Germantown; Consulting Ophthalmologist to St. Vincent's Home. 1507 Locust St.

1913. Jones, John F. X., B.S., A.B., A.M., M.D., Assistant Surgeon to St. Joseph's Hospital; Assistant Surgeon to the Philadelphia General Hospital. 1831 Chestnut St.

1900. Jopson, John H., M.D., Professor of Surgery in the Philadelphia Polyclinic; Associate in Surgery in the University of Pennsylvania; Surgeon to the Presbyterian and the Children's Hospitals. 1824 Pine St.

1900. Judson, Charles F., A.B., M.D., Physician to St. Christopher's Hospital for Children, to the Southern Home for Destitute Children and to the Sheltering Arms. 1005 Spruce Street.

ELECTED

1902. Jump, Henry D., M.D., Instructor in Medicine in the University of Pennsylvania; Assistant Physician to the Medical Dispensary of the University Hospital. 4634 Chester Ave.

1886. Jurist, Louis, M.D. 916 N. Broad St.

1903. Kalteyer, Frederick J., M.D., Demonstrator of Clinical Medicine in the Jefferson Medical College; Chief of the Out-patient Department, Assistant Attending Physician, and Hematologist to the Jefferson Medical College Hospital; Pathologist to Philadelphia Lying-in-Charity. 1533 Pine St.

1904. Kane, Bayard M.D., Fernhill Farm, West Chester, Pa.

*1910. Karsner, Howard T., M.D., Assistant Professor of Pathology in the Harvard Medical School. 240 Longwood Ave., Boston, Mass.

†1867. Keen, William W., M.D., LL.D., (Hon.) F.R.C.S. (Eng. and Edin.), Emeritus Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Membre Correspondant Etranger de la Société de Chirurgie de Paris; Honorary Member of the Société Belge de Chirurgie and of the Clinical Society of London; Ehren mitglied der deutschen Gesellschaft für Chirurgie. 1729 Chestnut St.

1912. Keene, Floyd E., M.D., Instructor in Gynecology in the University of Pennsylvania; Assistant Gynecologist to the University Hospital; Gynecologist to the Chestnut Hill Hospital. 116 S. Nineteenth St.

1913. Kelly, Francis Joseph, M.D. 1809 Chestnut St.

*1887. Kelly, Howard A., A.B., M.D., LL.D. (Aberdeen, Wash. and Lee, and Univ. of Pa.), Professor of Gynecology in Johns Hopkins University and Gynecologist to the Johns Hopkins Hospital, Baltimore, Md.; Hon. Fellow of the Edinburgh Obstetrical Society, the Royal Academy of Medicine of Ireland, and of the Glasgow Obstetrical and Gynecological Society. 1406 Eutaw Place, Baltimore, Md.

1909. Kelly, James A., A.M., M.D., Surgeon to St. Mary's Hospital; Pathologist and Associate in Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine. 1510 N. Seventeenth St.

1912. Kelly, Thomas C., A.M., M.D., Assistant Instructor of Medicine in the University of Pennsylvania; Pediatrician to St. Mary's Hospital; Physician to Out-Patient Department of Germantown Hospital. 105 School Lane, Germantown.

ELECTED

1898. Kempton, Augustus F., M.D. 2118 Pine St.

1905. Kercher, Delno E., M.D. 1534 Pine St.

*1907. Kinyoun, Joseph J., M.D. (Georgetown), Professor of Pathology and Bacteriology in the George Washington University. 1423 Clifton St., Washington, D.C.

1910. Klaer, Fred Harlen, A.B., M.D., Instructor in Medicine in the University of Pennsylvania; Physician-in-Charge of the Medical Dispensary of the University Hospital; Consulting Physician to the Chester County Hospital, West Chester, Pa. 1805 Pine St.

1913. Klopp, Edward J., M.D. 1223 Spruce St.

1895. Kneass, Samuel S., M.D., Associate in the William Pepper Laboratory of Clinical Medicine in the University of Pennsylvania. 1510 Walnut St.

1908. Knipe, Jay C., M.D., Ophthalmologist to the Jewish Hospital; Assistant Ophthalmologist to the Philadelphia General Hospital, and to the Mary J. Drexel Home; Chief of the Eye Clinic at the Jefferson Medical College Hospital; Demonstrator of Osteology and Syndesmology in the Jefferson Medical College. 2035 Chestnut St.

1908. Knowles, Frank Crozier, M.D., Instructor in Dermatology in the University of Pennsylvania; Clinical Professor of Dermatology in the Woman's Medical College; Dermatologist to the Presbyterian Hospital; Assistant Dermatologist to the Dispensary of the Pennsylvania Hospital. 2022 Spruce St.

1904. Krauss, Frederick, M.D., Ophthalmic Surgeon to the Episcopal Hospital; Ophthalmic and Aural Surgeon to St. Christopher's Hospital for Children and Dispensary; Ear, Nose, and Throat Physician to the Children's Seashore House for Invalid Children, Atlantic City, N. J. 1701 Chestnut St.

1905. Kremer, Walter H., M.D., 5904 Greene St., Germantown.

1900. Krusen, Wilmer, M.D., Professor of Gynecology in the Medical Department of Temple University; Chief Gynecologist to the Samaritan and the Garretson Hospitals; Consulting Gynecologist to the Charity and Mercy Hospitals. 127 N. Twentieth St.

1897. Kyle, D. Braden, A.M., M.D., Professor of Laryngology in the Jefferson Medical College; Consulting Laryngologist, Rhinologist, and Otologist to St. Agnes' Hospital and to the Philadelphia Home for Incurables; Laryngologist to the New Jersey Training School for Feeble-minded Children; Bacteriologist to the Orthopædic Hospital and Infirmary for Nervous Diseases. 1517 Walnut St.

ELECTED

1913. Laird, John Lohra, A.B., M.D., Assistant Surgeon in Genito-Urinary Diseases to the University Hospital; Associate in Serology in the William Pepper Laboratory of Clinical Medicine in the University of Pennsylvania; Assistant Instructor in Genito-Urinary Surgery in the University of Pennsylvania. 247 S. Seventeenth St.

1909. Laird, J. Packard, M.D., Visiting Physician to the Devon Branch of Presbyterian Hospital of Philadelphia. Devon, Pa.

1904. Landis, Henry R. M., M.D., Director of the Clinical and Sociological Departments of the Henry Phipps Institute of the University of Pennsylvania; Assistant Professor in Medicine in the University of Pennsylvania; Visiting Physician to the White Haven Sanatorium. 11 S. Twenty-first St.

1907. Langdon, H. Maxwell, M.D., Instructor in Ophthalmology in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Diseases of the Eye in the University Hospital; Assistant Ophthalmologist to the Orthopædic Hospital; Chief of the Dispensary for Diseases of the Eye of the Presbyterian Hospital. 2018 Chestnut St.

1904. Le Boutillier, Theodore, M.D., Clinical Professor of Pediatrics in the Woman's Medical College of Pennsylvania; Physician to the Dispensary of St. Christopher's Hospital for Children; Pediatrist to the Woman's College Hospital Dispensary; Visiting Physician to the Baptist Orphanage and to the Southern Home for Destitute Children. 9 S. Twenty-first St.

1893. Le Conte, Robert G., A.B., M.D., Surgeon to the Pennsylvania and the Bryn Mawr Hospitals; Consulting Surgeon to Germantown and Gynecean Hospitals. 1530 Locust St.

1909. L'Engle, Edward M., M.D. Jacksonville, Fla.

1887. Leaman, Henry, M.D. 832 N. Broad St.

1908. Lee, Walter Estell, M.D., Surgeon to the Gynecological Dispensary of the Pennsylvania Hospital; Surgeon to the Dispensary of the Germantown Hospital; Episcopal Hospital and Children's Hospital; Surgeon to the Glen Mills Schools. 905 Pine St.

1903. Leffmann, Henry, A.M., M.D., D.D.S., Ph.D., Professor of Chemistry in the Woman's Medical College of Pennsylvania; Honorary Professor of Chemistry in the Wagner Free Institute of Science; Pathological Chemist to the Jefferson Medical College Hospital; Formerly Port Physician of Philadelphia. 1839 N. Seventeenth St.

ELECTED

1892. Leidy, Joseph, M.D., Officer l'instruction publique, France; Consulting Physician to the Pennsylvania Training School for Feeble-minded Children. 1319 Locust St.

1877. Lewis, Morris J., M.D., Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases and to the Pennsylvania Hospital. 1316 Locust St.

1911. Lewis, Paul A., M.D., Director of the Pathological Department of the Henry Phipps Institute of the University of Pennsylvania; Assistant Professor of Pathology in the University of Pennsylvania; Director of the Ayer Clinical Laboratory of the Pennsylvania Hospital. Henry Phipps Institute, 238 Pine St.

1904. Lindauer, Eugene, M.D., Instructor of Neurology in the Medico-Chirurgical Hospital; Associate in Clinical Medicine in the Philadelphia Polyclinic; Assistant Neurologist to the Philadelphia General Hospital. 2018 N. Thirty-second St.

1886. Lloyd, J. Hendrie, A.M. (Princeton), M.D., Neurologist to the Philadelphia General Hospital, and to the Methodist Episcopal Hospital; Consulting Neurologist to the State Asylum for the Chronic Insane at Wernersville, and to the Pennsylvania Training School for Feeble-minded Children at Elwyn. 116 S. Twenty-first St.

1907. Lodholz, Edward, M.D., Demonstrator of Physiology in the University of Pennsylvania. 3103 Diamond St.

1893. Longaker, Daniel, M.D., Surgeon to the Jewish Maternity Hospital. 1402 N. Sixteenth St.

*1906. Longcope, Warfield T., M.D., Assistant Professor of the Practice of Medicine in Columbia University, New York; Associate Attending Physician to the Presbyterian Hospital, New York. 680 Madison Ave., New York City.

1877. Longstreth, Morris, M.D. 101 Brattle St., Cambridge, Mass.

1907. Loux, Hiram R., M.D., Professor of Genito-Urinary Surgery in the Jefferson Medical College; Surgeon to the Philadelphia General Hospital. 1819 Walnut St.

1900. McCarthy, Daniel J., M.D., Professor of Medical Jurisprudence (George B. Wood Foundation) in the University of Pennsylvania; Neurologist to the Philadelphia General and St. Agnes' Hospitals, and to the Henry Phipps Institute. 2025 Walnut St.

ELECTED

1903. McConnell, Guthrie, M.D., Professor of Pathology and Bacteriology in the Medical Department of Temple University; Pathologist to the Samaritan Hospital. Temple Medical School, Eighteenth and Buttonwood Sts.

1913. McCrea, Thomas, B.A., M.D., F.R.C.P. (Lond.), Professor of Medicine in the Jefferson Medical College; Physician to the Jefferson and Pennsylvania Hospitals. 1627 Spruce Street.

1895. McFarland, Joseph, M.D., Professor of Pathology and Bacteriology in the Medico-Chirurgical College; Professor of Pathology in the Woman's Medical College of Pennsylvania; Pathologist to the Medico-Chirurgical and to the Philadelphia General Hospitals. 442 W. Stafford St., Germantown.

1913. McGlinn, John A., B.A., M.D., Assistant Professor of Obstetrics in the Medico-Chirurgical College; Assistant Obstetrician to the Medico-Chirurgical Hospital; Gynecologist to St. Agnes' Hospital. 113 S. Twentieth St.

1905. McKenzie, Robert Tait, A.B., M.D., Professor of Physical Education and Director of the Department of Physical Education in the University of Pennsylvania. 26 S. Twenty-first St.

*1900. McReynolds, Robert Phillips, M.D. 213 S. Broadway, Los Angeles, Cal.

1886. MacCoy, Alexander W., M.D., Fellow of the American Laryngological Association; Consulting Laryngologist to the Bryn Mawr Hospital. 216 S. Fifteenth St.

1910. MacKinney, William H., M.D., Assistant Surgeon to the Dispensary for Genito-urinary Diseases, University Hospital; Assistant in the Urological Dispensary of the German Hospital. 1701 Chestnut St.

1913. Major, C. Percy, M.D. Tenth and Oak Lane.

1896. Makuen, G. Hudson, M.D., Professor of Defects of Speech in the Philadelphia Polyclinic; Laryngologist and Otogist to the Chester Hospital; Consultant Laryngologist and Otologist to the Roosevelt and Frederick Douglass Hospitals; Consultant on Defects of Speech to the New Jersey Training School for Feeble-minded Children. 1627 Walnut Street.

1913. Manges, Willis F., M.D., Röntgenologist to the Jefferson Hospital; Director of the Röntgen Ray Laboratory in the Philadelphia General Hospital. 264 S. Sixteenth St.

ELECTED

1898. Marshall, George Morley, M.D., Laryngologist to the Philadelphia General Hospital; Laryngologist and Otologist to St. Joseph's Hospital. 1819 Spruce St.

1893. Marshall, John, M.D., Nat.Sc.D. (Tübingen), LL.D. Professor of Chemistry and Toxicology in the University of Pennsylvania. 1718 Pine St.

1889. Martin, Edward, M.D., John Rhea Barton Professor of Surgery in the University of Pennsylvania; Surgeon to the University, Howard, Philadelphia General, and Bryn Mawr Hospitals. 1506 Locust St.

1885. Mays, Thomas J., M.D., Visiting Physician to the Rush Hospital. 1829 Spruce St.

*1868. Mears, J. Ewing, A.M., M.D., LL.D. 1535 Land Title Building, Broad and Sansom Sts.

1911. Meigs, Edward Browning, A.B., M.D., Fellow in Physiology at the Wistar Institute. Wistar Institute, Thirty-sixth St. and Woodland Ave.

*1894. Miller, D. J. Milton, M.D., Associate Physician to the Children's Hospital. 127 S. Illinois Ave., Atlantic City, N. J.

1910. Miller, Morris Booth, M.D., Professor of Surgery in the Philadelphia Polyclinic; Surgeon to the Douglass Memorial Hospital; Assistant Surgeon to the Philadelphia General Hospital. 2117 Pine St.

1881. Mills, Charles K., M.D., Professor of Neurology in University of Pennsylvania; Neurologist to Philadelphia General Hospital; Consulting Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases. 1909 Chestnut St.

1904. Mitchell, Charles F., M.D., Surgeon to the Germantown Hospital and to the Out-patient Department of the Pennsylvania Hospital; Assistant Surgeon to Orthopædic Hospital and Infirmary for Nervous Diseases. 342 S. Fifteenth St.

†1888. Mitchell, John K., M.D., Assistant Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Assistant Neurologist to the Presbyterian Hospital; Attending Physician to the Pennsylvania Training School for Feeble-minded Children. 1730 Spruce St.

1856. Mitchell, Silas Weir, M.A., M.D., LL.D. (Edinburgh, Harvard, Princeton, and Toronto), Corresponding Member of the French Academy of Medicine; Corresponding Member of the Verein für innerer Medicin, Berlin; Honorary Member of the Royal Medico-Chirurgical Society of London; Doctor of Medicine, Honoris Causa, University of Bologna. 1524 Walnut St.

ELECTED

1908. Montgomery, Charles M., A.B., M.D., Physician to the Dispensary and Instructor in the Henry Phipps Institute (University of Pennsylvania); Physician to the Home for Consumptives at Chestnut Hill. 905 Pine St.

1882. Montgomery, Edward E., A.M., M.D., LL.D., Professor of Gynecology in the Jefferson Medical College; Gynecologist to the Jefferson Medical College Hospital and to St. Joseph's Hospital. 1426 Spruce St.

1886. Morris, Caspar, M.D. 2050 Locust St.

1893. Morris, Elliston J., M.D., Physician to the Episcopal Hospital and to the Midnight Mission. 128 S. Eighteenth St.

1883. Morris, Henry, M.D., Professor of Anatomy in the Woman's Medical College of Pennsylvania; Senior Visiting Physician to St. Joseph's Hospital; Associate Member, Military Surgeons of U. S. A. 313 S. Sixteenth St.

1856. Morris, J. Cheston, M.D. 1514 Spruce St.

1906. Morrison, William H., M.D. 8021 Frankford Ave.

1897. Morton, Samuel W., M.D. 1933 Chestnut St.

1904. Moulton, Albert R., M.D., Senior Assistant Physician to the Pennsylvania Hospital for the Insane; Physician to the Out-patient Department for Nervous and Mental Diseases at the Pennsylvania Hospital; Professor of Mental Diseases in the Maine Medical School (Bowdoin College). Pennsylvania Hospital for the Insane. Forty-fourth and Market Sts.

1905. Müller, George P., M.D., Associate in Surgery in the University of Pennsylvania; Assistant Surgeon to the University Hospital; Professor of Surgery in the Philadelphia Polyclinic; Surgeon to St. Agnes' Hospital; Consulting Surgeon to the Chester County Hospital. 334 S. Fifteenth Street.

1905. Mutschler, Louis H., M.D., Surgeon to the Episcopal Hospital; Assistant Surgeon to the Orthopædic Hospital. 2030 Tioga St.

1896. Myers, T. D., M.D. 1521 Spruce St.

1902. Nassau, Charles F., M.D., Assistant Professor of Surgery in the Jefferson Medical College; Surgeon to St. Joseph's Hospital; Consulting Surgeon to the Frankford Hospital; Assistant Surgeon to the Jefferson Medical College Hospital. 1831 Chestnut St.

1886. Neff, Joseph S., A.M., M.D., LL.D., D.P.H. 580 City Hall.

ELECTED

1887. Neilson, Thomas Rundle, A.M., M.D., Surgeon to the Episcopal Hospital and to St. Christopher's Hospital for Children; Professor of Genito-urinary Diseases in the University of Pennsylvania. 1937 Chestnut St.

1905. Newcomet, William S., M.D. 3501 Baring St.

1905. Newlin, Arthur, B.S., M.D., Physician to the Pennsylvania Hospital; Physician to the Dispensary of the Children's Hospital; Assistant Physician to the Orthopædic Haspital. 1804 Pine St.

1899. Nicholson, William Rufus, A.B., M.D., Gynecologist to the Polyclinic Hospital; Obstetrician to the Presbyterian Hospital; Associate in Obstetrics in the University of Pennsylvania. 1731 Pine St.

1889. Noble, Charles P., M.D. West Point Pleasant, N. J.

1898. Nolan, Edward J., M.D., Recording Secretary and Librarian of the Academy of Natural Sciences of Philadelphia. 825 N. Twentieth St.

1905. Norris, Charkes C., M.D., Instructor in Gynecology in the University of Pennsylvania; Attending Physician to the Maternity Hospital; Consultant Gynecologist and Obstetrician to the Henry Phipps Institute of the University of Pennsylvania; Assistant Gynecologist to the University and Philadelphia General Hospitals. 1503 Locust St.

1905. Norris, George William, A.B., M.D., Assistant Professor of Medicine in the University of Pennsylvania; Physician to the Pennsylvania Hospital; Assistant Physician to the University Hospital. 1530 Locust St.

*1901. Norris, Henry, M.D., Surgeon to the Rutherford Hospital. Rutherfordton, N. C.

*1865. Norris, Isaac, M.D. Fairhill, Bryn Mawr, Pa.

1892. Norris, Richard C., M.D., Lecturer on Clinical and Operative Obstetrics in the University of Pennsylvania; Obstetrician in Charge of the Preston Retreat; Visiting Obstetrician to the Philadelphia General Hospital; Gynecologist to the Methodist Episcopal Hospital, and Consulting Obstetrician and Attending Gynecologist to the Southeastern Dispensary and Hospital. 500 N. Twentieth St.

1913. O'Neal, Alexander H., A.B., A.M., M.D., Physician to the Cathcart and Richardson Homes, Devon; Anesthetizer to the Bryn Mawr Hospital. Wayne, Pa.

ELECTED

*1884. O'Neill, J. Wilks, M.D. Bergenfield, N. J.

*1885. Osler, Sir William, Bart., M.D., Regius Professor of Medicine in Oxford University, England. No. 7, Norham Gardens, Oxford, England.

1903. Ostheimer, Maurice, M.D., Associate in Pediatrics in the University of Pennsylvania; Physician-in-Charge of the Children's Dispensary and Assistant Visiting Pediatric Physician, University Hospital; Physician to the Medical Dispensary of Children's Hospital; Physician to the Austro-Hungarian Consulate, Philadelphia. 2202 De Lancey St.

1913. Outerbridge, George W., A.B., M.D., Assistant Instructor of Surgical Pathology in the University of Pennsylvania; Obstetrician to the Maternity Hospital; Out-Patient Surgeon and Pathologist to the Gynecean Hospital. 2040 Chestnut St.

1897. Packard, Francis R., M.D., Surgeon to the Out-patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Laryngologist to the Children's Hospital of Philadelphia; Consulting Aurist to the Bryn Mawr Hospital. 304 S. Nineteenth St.

1898. Page, Henry F., M.D., Assistant Physician to the German Hospital and Physician to the Medical Dispensary of the same; Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania. 315 S. Sixteenth St.

1906. Pancoast, Henry K., M.D., Professor of Röntgenology in the University of Pennsylvania and Röntgenologist to the University Hospital. Bala, Pa.

1909. Parish, Benjamin D., B.S., M.D., Assistant Instructor in Otology in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Diseases of the Ear, University Hospital; Aurist and Laryngologist to St. Agnes' Hospital. 29 S. Nineteenth St.

1899. Parke, William E., M.D., Consulting Obstetrician to the Episcopal Hospital; Associate Surgeon to the Kensington Hospital for Women; Gynecologist to the Frankford Hospital. 1739 N. Seventeenth St.

1910. Patterson, Ross Vernet, M.D., Assistant Professor of Medicine in the Jefferson Medical College; Assistant Physician to the Jefferson Hospital. 340 S. Sixteenth St.

1903. Pearce, Richard M., M.D., Professor of Research Medicine in the University of Pennsylvania. 2114 De Lancey Place.

ELECTED

1909. Pemberton, Ralph, M.S., M.D., Visiting Physician to the Presbyterian Hospital; Director of the Department of Clinical Chemistry in the Pathological Laboratory of the Presbyterian Hospital. 2224 Locust St.

†1889. Penrose, Charles Bingham, M.D., Ph.D. (Harvard), Formerly Professor of Gynecology in the University of Pennsylvania. 1720 Spruce St.

†1902. Pepper, William, M.D., Dean of the School of Medicine, and Assistant Professor of Clinical Pathology in the University of Pennsylvania; Physician to the Philadelphia General Hospital; Assistant Physician to the University Hospital. 1811 Spruce St.

1912. Petty, Orlando H., B.S., A.M., M.D., Instructor in Medicine in the Jefferson Medical College; Pathologist and Assistant Physician to St. Timothy's Hospital. 6215 Ridge Ave.

1905. Pfahler, George E., M.D., Director of the Röntgen Ray Laboratory of Medico-Chirurgical Hospital. 1321 Spruce St.

1907. Pfromm, George W., Ph.G., M.D., Assistant Physician to the American Stomach Hospital; Consulting Physician to the German Protestant Home for the Aged. 1431 N. Fifteenth St.

1907. Phillips, Horace, M.D., Second Assistant Physician to the Pennsylvania Hospital for the Insane; Visiting Physician to the Eastern Penitentiary of Pennsylvania. Pennsylvania Hospital for the Insane, Forty-fourth and Market Sts.

1911. Physick, Emlen, M.D. Cape May, N. J.

1883. Piersol, George A., M.D., Sc.D., Professor of Anatomy in the University of Pennsylvania. 4724 Chester Ave.

1911. Piersol, George Morris, B.S., M.D., Associate in Medicine in the University of Pennsylvania; Physician to the Episcopal Hospital; Assistant Physician to the University Hospital; Registrar to the Philadelphia General Hospital. 1927 Chestnut St.

1905. Pitfield, Robert L., M.D., Pathologist to the Germantown Hospital; Bacteriologist to the Chestnut Hill Hospital for Lung Diseases. 5211 Wayne Ave.

1896. Posey, William Campbell, M.D., Surgeon to the Wills Eye Hospital; Professor of Ophthalmology in the Philadelphia Polyclinic and College for Graduates in Medicine; Ophthalmic Surgeon to the Howard Hospital; Ophthalmologist to the Pennsylvania Hospital for Epileptics. 2049 Chestnut Street.

ELECTED

1899. Potts, Charles S., M.D., Professor of Neurology in the Medico-Chirurgical College; Neurologist to the Philadelphia General Hospital; Consultant to the Insane Department of the Philadelphia General Hospital; Consultant to the Hospital for the Insane, Atlantic County, New Jersey. 2018 Chestnut St.

1907. Price, George E., M.D., Associate Professor of Nervous and Mental Diseases in the Jefferson Medical College; Neurologist to the Philadelphia General Hospital. 1700 Walnut St.

†1903. Pyle, Walter L., A.M., M.D., Member of the American Ophthalmological Society; Assistant Surgeon to the Wills Eye Hospital. 1931 Chestnut St.

1908. Radcliffe, McCluney, A.M. (Lafayette), M.D., Attending Surgeon to the Wills Eye Hospital. 1906 Chestnut St.

1913. Randall, Alexander, A.M., M.D., Assistant Instructor in Surgery in the University of Pennsylvania; Assistant Surgeon in the Genito-Urinary Dispensary of the University of Pennsylvania. Professional Building, Room 401.

1887. Randall, B. Alexander, M.A., M.D., Professor of Otology in the University of Pennsylvania; Ear Surgeon to the Children's Hospital; Consulting Aurist to the Pennsylvania Institution for the Deaf and Dumb, and to St. Timothy's Hospital. 1717 Locust St.

*1904 Ravenel, Mazyck P., M.D., Professor of Bacteriology in the University of Wisconsin. Madison, Wis.

1887. Reed, Charles H., M.D. 121 S. Seventeenth St.

1885. Reichert, Edward T., M.D., Professor of Physiology in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

1897. Rhein, John H. W., M.D., Professor of Diseases of the Mind and Nervous System in the Philadelphia Polyclinic and College for Graduates in Medicine; Neurologist to the Howard Hospital; Physician to the Philadelphia Home for Incurables; Bacteriologist to the Pennsylvania Training School for Feeble-minded Children. 1732 Pine St.

1906. Rhein, Robert D., M.D., Chief Physician to the Clinic of the American Hospital for Diseases of the Stomach; Physician to the Philadelphia Home for Incurables; Examining Physician to the White Haven Sanatorium. 2016 Pine St.

1891. Rhoads, Edward G., M.D. 159 W. Coulter St., Germantown.

ELECTED

1910. Rhoads, Samuel, M.D., Visiting Physician to the Tuberculosis Department of the Philadelphia General Hospital; Consulting Physician to the Home for Consumptives, Chestnut Hill. 152 Schoolhouse Lane, Germantown.

1898. Riesman, David, M.D., Professor of Clinical Medicine in the University of Pennsylvania; Professor of Clinical Medicine in the Philadelphia Polyclinic; Physician to the Philadelphia General and the Jewish Hospitals. 1715 Spruce St.

1895. Ring, G. Oram, A.M., M.D., Ophthalmic Surgeon to the Episcopal Hospital; Ophthalmologist to the Widener Memorial Home for Crippled Children; Consulting Ophthalmologist to the American Oncologic Hospital. 2014 Chestnut St.

1905. Risley, J. Norman, M.D., Assistant Surgeon to the Wills Eye Hospital; Ophthalmologist to the Pennsylvania Training School for Feeble-minded Children. 134 S. Twentieth Street.

1891. Risley, S. D., A.M., M.D., Ph.D., Attending Surgeon to the Wills Eye Hospital; Professor (Emeritus) of Ophthalmology in the Philadelphia Polyclinic and College for Graduates in Medicine; Member of the Board of Managers of the Pennsylvania Training School for Feeble-minded Children; Alumnus Manager of the University Hospital. 2018 Chestnut St.

†1878. Roberts, John B., M.D., Professor of Surgery in the Philadelphia Polyclinic; Surgeon to the Methodist Episcopal Hospital. 313 S. Seventeenth St.

1899. Roberts, Walter, M.D., Professor of Otology in the Philadelphia Polyclinic; Otologist to the Methodist Episcopal Hospital; Laryngologist to the Philadelphia General Hospital. 1732 Spruce St.

1903. Robertson, William Egbert, M.D., Professor of Theory and Practice of Medicine and of Clinical Medicine in Temple University; Physician to the Episcopal, Samaritan, and Garretson Hospitals. 327 S. Seventeenth St.

*1910. Robinson, G. Canby, M.D., Chief Resident Physician at the Hospital of the Rockefeller Institute, Sixty-sixth Street and Avenue A, New York.

1902. Robinson, James Weir, M.D., Assistant Surgeon to the Presbyterian Hospital. 326 S. Sixteenth St.

1903. Robinson, William Duffield, Ph.G., M.D. 2012 Mount Vernon St.

ELECTED

1912. Rodman, John Stewart, M.D., Lecturer on Surgery in the Medico-Chirurgical College; Assistant Surgeon to the Medico-Chirurgical Hospital; Surgeon to the Dispensary of the Presbyterian Hospital; Assistant Surgeon to the Out-patient Department of the Pennsylvania Hospital. 2106 Walnut St.

1900. Rodman, William L., M.D., Professor of Surgery in the Medico-Chirurgical College; Surgeon to the Presbyterian Hospital; Surgeon to the Philadelphia General Hospital. 2106 Walnut St.

1909. Rosenberger, Randle C., M.D., Professor of Hygiene and Bacteriology in the Jefferson Medical College; Professor of Hygiene and Preventive Medicine in the Woman's Medical College of Pennsylvania; Director of the Clinical Laboratory of the Philadelphia General Hospital. 2330 N. Thirteenth St.

1898. Ross, George G., M.D., Assistant Surgeon to the German Hospital and Surgeon to the Out-patient Department of the same; Surgeon to the Germantown Hospital; Surgeon to the Stetson Hospital; Instructor in Surgery in the University of Pennsylvania. 1721 Spruce St.

*1907. Royer, B. Franklin, M.D. Donaldson Bldg., Harrisburg, Pa.

†1905. Rugh, James Torrance, M.D., Associate in Orthopedic Surgery in the Jefferson Medical College; Orthopedic Surgeon to the Methodist and the Philadelphia General Hospitals; Member of the American Orthopedic Association. 1616 Spruce St.

1897. Sailer, Joseph, Ph.B., M.D., Professor of Clinical Medicine in Universtiy of Pennsylvania; Physician to the Philadelphia, the University, and Presbyterian Hospitals. 1830 Spruce St.

1900. Sajous, Charles E. de M., M.D., B.Lett., LL.D., Knight of the Legion of Honor, and Officer of the Academy of France; Corresponding Member of the Society of Public Medicine of Belgium; Member of Honor of the French Society of Hygiene, etc. 2043 Walnut St.

1905. Sartain, Paul J., M.D. 212 W. Logan Square.

1908. Sautter, Albert C., M.D., Assistant in the Dispensary for Diseases of the Eye in the University Hospital; Assistant in the Eye Dispensary of the German Hospital. 1421 Locust St.

1906. Saylor, Edwin S., M.D. 2005 Chestnut St.

ELECTED

*1910. Scarlet, Rufus B., M.D., Laryngologist to the Home for Consumptives at Chestnut Hill; Assistant in the Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Instructor in Diseases of the Nose and Throat in the Philadelphia Polyclinic and College for Graduates in Medicine. 78 N. Clinton Ave., Trenton, N. J.

1899. Schamberg, Jay F., M.D., Professor of Dermatology and Infectious Eruptive Diseases in the Philadelphia Polyclinic and College for Graduates in Medicine; Assistant Physician to the Municipal Hospital for Infectious Diseases. 1922 Spruce St.

1887. de Schweinitz, George E., A.M., M.D., Professor of Ophthalmology in the University of Pennsylvania; Ophthalmic Surgeon to the Philadelphia General Hospital; Consulting Ophthalmic Surgeon to the Philadelphia Polyclinic; Ophthalmologist to the Orthopædic Hospital and Infirmary for Nervous Diseases. 1705 Walnut St.

1913. de Schweinitz, George Lord, B.S., M.D., Assistant Surgeon in the Eye Dispensary of the University Hospital; Ophthalmologist to the Haddock Memorial Home; Ophthalmologist to the Williamson School. 2040 Chestnut St.

1910. Schwenk, Peter N. K., M.A., M.D., Attending Surgeon to the Eye Department of the Pennsylvania Hospital; Attending Surgeon to the Wills Eye Hospital. 1417 N. Broad St.

1892. Seiss, Ralph W., M.D., Professor of Otology in the Philadelphia Polyclinic; Consulting Laryngologist to the Pennsylvania Institution for the Deaf and Dumb. 255 S. Seventeenth St.

1908. Shannon, Charles E. G., A.B., M.D., Instructor in Ophthalmology in the Jefferson Medical College; Assistant in the Ophthalmological Clinic at the Jefferson Medical College Hospital; Ophthalmologist to the Seybert Institution. 1633 Spruce St.

1897. Sharpless, William T., M.D., Physician to the Chester County Hospital. West Chester, Pa.

1906. Shields, William G., M.D., Chief of Dermatological Clinic and Assistant Physician to the Jewish Hospital. 412 Schoolhouse Lane, Germantown.

1890. Shoemaker, George Erety, A.M., M.D., Gynecologist to the Presbyterian Hospital and to the Pennsylvania Epileptic Hospital and Colony Farm. 1831 Chestnut St.

ELECTED

*1908. Shoemaker, Harlan, A.B., M.D., Surgeon to Shelby Hospital; Lt. M.R.C., U.S.A. 2005 Congress Ave., Los Angeles, Cal.

†1893. Shoemaker, Harvey, M.D., Visiting Physician to the Sheltering Arms; Consulting Physician to the Southern Home for Destitute Children; Assistant Physician to the German Hospital; Physician to the Out-patient Department of the German Hospital. 2011 Chestnut St.

†1896. Shoemaker, William T., M.D., Associate Clinical Professor of Ophthalmology in the Woman's Medical College of Pennsylvania; Ophthalmic Surgeon to the Germantown Hospital, and Attending Surgeon to the Eye Department of the Pennsylvania Hospital; Assistant Ophthalmologist and Chief of Clinic to the German Hospital; Consulting Ophthalmalogist to the Pennsylvania Institution for the Deaf and Dumb, and to the Southern Home for Destitute Children. 109 S. Twentieth St.

1900. Shumway, Edward Adams, B.S., M.D., Instructor in Ophthalmology in the University of Pennsylvania, and Assistant Ophthalmic Surgeon to the University Hospital; Assistant Ophthalmologist to the Philadelphia General Hospital; Assistant Ophthalmologist and a Chief of Clinic to the German Hospital 2007 Chestnut St.

1903. Sinclair, John Falconer, M.D., Physician to the Medical Dispensary of the Presbyterian Hospital; Physician to the Philadelphia Orphan Asylum and to the Presbyterian Orphanage; Physician to the Home of the Merciful Saviour for Crippled Children. 4103 Walnut St.

1907. Sinkler, Francis Wharton, A.B., M.D., Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Physician to the Episcopal Hospital. 1606 Walnut St.

1902. Siter, E. Hollingsworth, M.D., Instructor in Genito-urinary Diseases in the University of Pennsylvania; Genito-urinary Surgeon to the Philadelphia General Hospital; Surgeon-in-Charge of the Genito-urinary Dispensary of the University Hospital; Consulting Genito-Urinary Surgeon to the Eastern Penitentiary, and to the Philadelphia County Prison. 1818 S. Rittenhouse Square.

1904. Skillern, Penn Gaskell, M.D. 241 S. Thirteenth St.

1904. Smith, Allen J., A.M., M.D., Sc.D. (Penna. Coll.), LL.D. (McGill Univ.), Professor of Pathology and of Comparative Pathology, and Director of Courses in Tropical Medicine in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

ELECTED

1905. Smith, S. MacCuen, M.D., Professor of Otology in the Jefferson Medical College; Aurist and Laryngologist to the Germantown Hospital; Aurist to the Jewish Hospital; Consulting Aurist to the Oncologic Hospital. 1429 Spruce St.

1908. Speese, John, M.D., Instructor in Surgery in the University of Pennsylvania; Surgeon to the Dispensary of the Presbyterian, Children's, and Polyclinic Hospitals. 2206 Locust St.

1895. Spellissy, Joseph M., A.M., M.D., Surgeon to the Out-patient Department of the Pennsylvania Hospital; Visiting Surgeon to St. Joseph's and to the Methodist Episcopal Hospitals; Assistant Surgeon to the Orthopedic Department of the University Hospital. 110 S. Eighteenth St.

1897. Spiller, William G., M.D., Associate Professor of Neurology and Professor of Neuropathology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania. 4409 Pine St.

1908. Spitzka, Edward Anthony, M.D., Director and Professor of Anatomy in the Daniel Baugh Institute of Anatomy of the Jefferson Medical College. Eleventh and Clinton Sts.

1894. Stahl, B. Franklin, B.S., Ph.G., M.D., Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania; Associate in Medicine and Lecturer on Dietetics of the Sick in the University of Pennsylvania; Visiting Physician to St. Agnes' and the Philadelphia General Hospitals. 1727 Pine St.

1909. Starbuck, J. Clinton, M.D. 42E. Washington St., Media, Pa.

1875. Starr, Louis, M.D., LL.D. (Haverford). Care Starr Watkins & Co. 21 William St., New York City.

1912. Stauffer, Nathan Pennypacker, D.D.S., M.D., Laryngologist and Otologist to the Dispensary of the Presbyterian Hospital; to the Pennsylvania Hospital; to the Philadelphia General Hospital, Tubercular Department; to the Home for Crippled Children. 218 S. Twentieth St.

1910. Stellwagen, Thomas C., Jr., M.D., Chief Clinical Assistant in the Out-patient Surgical Department of the Jefferson Medical College Hospital. 110 S. Nineteenth St.

1884. Stelwagon, Henry W., M.D., Ph.D., Professor of Dermatology in the Jefferson Medical College; Honorary Fellow of the Society of Dermatology and Syphilography of Italy; Corresponding Fellow of the Society of Dermatology and Syphilography of France, of the Dermatological Society of Vienna, and of the Dermatological Society of Berlin. 1634 Spruce St.

ELECTED

1895. Stengel, Alfred, M.D., Sc.D., Professor of Medicine in the University of Pennsylvania; Physician to the University Hospital and the Pennsylvania Hospital. 1728 Spruce Street.

1901. Stevens, Arthur A., M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the Woman's Medical College of Pennsylvania; Lecturer on Physical Diagnosis in the University of Pennsylvania; Physician to the Episcopal and St. Agnes' Hospitals. 314 S. Sixteenth St.

1902. Stewart, Francis T., M.D., Professor of Clinical Surgery in the Jefferson Medical College; Surgeon to the Germantown Hospital; Surgeon to the Out-patient Department of the Pennsylvania Hospital. 311 S. Twelfth St.

1898. Stout, George C., M.D., Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine; Laryngologist and Aurist to the Presbyterian Hospital, the Children's Aid Society, and the William Penn Charter School. 1611 Walnut St.

1884. Stryker, Samuel S., M.D., Physician to the Presbyterian Hospital. 3833 Walnut St.

*1900. Swan, John M., M.D. 457 Park Avenue, Rochester, N. Y.

1898. Sweet, William M., M.D., Clinical Professor of Ophthalmology in the Jefferson Medical College, and Ophthalmic Surgeon to the Jefferson Medical College Hospital; Professor of Diseases of the Eye in the Philadelphia Polyclinic; Attending Surgeon to the Wills Eye Hospital. 1205 Spruce St.

1906. Tait, Thomas W., M.D., Ophthalmologist to the Charity Hospital. 320 S. Fifteenth St.

1900. Talley, James Ely, A.B., M.D., Physician to the Presbyterian Hospital. 218 S. Twentieth St.

1911. Taylor, Alonzo Englebert, M.D., Rush Professor of Physiological Chemistry in the University of Pennsylvania. 4522 Locust St.

1886. Taylor, John Madison, A.B. and A.M. (Princeton), M.D., Adjunct Professor of Non-Pharmaceutical Therapeutics in the Temple University; Editor *Monthly Cyclopedia of Practical Medicine;* Consulting Physician to the Elwyn, Pa., and the Vineland, N. J., Training Schools for Feeble-minded Children. 1504 Pine St.

ELECTED

1887. Taylor, William J., M.D., Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases, and to St. Agnes' Hospital; Consulting Surgeon to the West Philadelphia Hospital for Women. 1825 Pine St.

1886. Taylor, William L., M.D. 1340 N. Twelfth St.

1910. Thomas, Benjamin A., A.M., M.D., Professor of Genito-urinary Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Instructor in Surgery in the University of Pennsylvania; Surgeon-in-Chief to the Outpatient Department of the University Hospital. 116 S. Nineteenth St.

1867. Thomas, Charles Hermon, M.D. 3634 Chestnut St.

1912. Thomas, Frank Wister, A.M., M.D., Visiting Physician to "Buttercup Cottage;" Consulting Physician to the Germantown Hospital. 27 E. Mt. Airy Ave.

1907. Thomas, Thomas Turner, M.D., Associate Professor of Applied Anatomy, and Associate in Surgery in the University of Pennsylvania; Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the University Hospital. 2005 Chestnut St.

1897. Thomson, A. G., M.D., Ophthalmic Surgeon to the Pennsylvania Railroad Company. 724 Stock Exchange Bldg.

1896. Thorington, James, A.M., M.D., Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine; Ophthalmic Surgeon to the Presbyterian Hospital; Ophthalmologist to the Ellwyn, Pa., Training School for Feeble-minded Children. 2031 Chestnut St.

1898. Thornton, Edward Q., M.D., Assistant Professor of Materia Medica in the Jefferson Medical College. 1331 Pine St.

1912. Torrey, Robert G., M.D., Assistant Physician to the Philadelphia General Hospital; Physician to the State Tuberculosis Dispensary. 255 S. Sixteenth St.

1896. Toulmin, Harry, M.D., Medical Director of the Penn Mutual Life Insurance Company. 925 Chestnut St.

1908. Tracy, Stephen E., M.D., Gynecologist to the Stetson Hospital. 1527 Spruce St.

1901. Tucker, Henry, M.D., Genito-urinary Surgeon to the Philadelphia General Hospital; Curator of the Academy of Natural Sciences of Philadelphia. 2000 Pine St.

†1894. Tunis, Joseph Price, M.D., Clinical Assistant to the Nose and Throat Dispensary of the Polyclinic Hospital. St. Martin's, Philadelphia.

ELECTED

1901. Turner, John B., M.D. 1833 Chestnut St.

1866. Tyson, James, M.D., LL.D., Emeritus Professor of Medicine in the University of Pennsylvania and late Physician to the Hospital of the University of Pennsylvania, and to the Pennsylvania Hospital. 1506 Spruce St.

1897. Tyson, T. Mellor, M.D., Physician to the Philadelphia General Hospital; Physician to the Rush Hospital, the Philadelphia Lying-in-Charity Hospital, and the Children's Aid Society of Philadelphia. 1506 Spruce St.

1904. Uhle, Alexander A., M.D., Assistant Instructor in Genito-urinary Diseases in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Genito-urinary Diseases, University Hospital; Assistant Genito-urinary Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the Dispensary of the German Hospital. 1701 Chestnut Street.

1907. Ullom, Josephus Tucker, M.A., M.D., Member of the Staff of the Henry Phipps Institute, Visiting Physician to the Chestnut Hill Hospital. 24 Carpenter St., Germantown.

1913. Vail, William Penn., B.S., M.S., M.D., Laryngologist to the Pennsylvania Institution for the Instruction of the Blind; Laryngologist to the Department for Tuberculosis of the Philadelphia General Hospital; Assistant Laryngologist and Otologist to the Out-Patient Department of the Pennsylvania and German Hospitals; Assistant Laryngologist to the Clinic of the Children's Hospital. 1906 Chestnut St.

1873. Van Harlingen, Arthur, Ph.B. (Yale), M.D., Emeritus Professor of Diseases of the Skin in the Philadelphia Polyclinic; Dermatologist to the Children's Hospital. 1831 Chestnut St.

1903. Van Pelt, William Turner, M.D., Ophthalmic Surgeon to the Episcopal Hospital. 1528 Spruce St.

1893. Vansant, Eugene Larue, M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic; Visiting Physician to the Throat, Nose, and Ear Department of the Howard Hospital. 1929 Chestnut St.

1912. Vaux, Norris Wistar, M.D., Surgeon to the Chestnut Hill Hospital; Surgeon to the Dispensary of the Germantown Hospital. 8901 Germantown Ave., Chestnut Hill.

ELECTED

*1897. Veasey, Clarence A., A.M., M.D., Formerly Assistant Professor of Ophthalmology in the Jefferson Medical College, and Assistant Ophthalmologist to the Jefferson Medical College Hospital; Formerly Ophthalmic Surgeon to the Methodist Episcopal Hospital, Philadelphia. Suite 404 Paulsen Building, Spokane, Wash.

†1883. Vinton, Charles Harrod, A.M., M.D. Hotel New Chatham, Atlantic City, N. J.

1903. Wadsworth, William Scott, M.D. 207 S. Forty-fifth St.

1906. Walker, John K., M.D., Physician to the Children's Hospital of the Mary J. Drexel Home; Physician to the Out-patient Department of the Pennsylvania Hospital. 1915 Rittenhouse St.

1907. Walker, Warren, M.D., Dermatologist to the Episcopal Hospital. 1632 Spruce St.

1904. Walsh, Joseph, A.M., M.D., Visiting Physician to the White Haven Sanatorium and Vice-President of the Board of Directors; Consulting Physician to the Department of Tuberculosis at the Philadelphia General Hospital; Medical Director of St. Agnes' Hospital. 736 Pine St.

1910. Ward, E. Tillson, A.M., M.D. 1415 S. Broad St.

1893. Warren, Joseph W., M.D. 220 S. Broad St.

1895. Watson, Arthur W., M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic and College for Graduates in Medicine; Laryngologist to the Jewish Hospital; Laryngologist and Aurist to the Mt. Sinai Hospital; Laryngologist to Home for Incurables. 126 S. Eighteenth St.

1886. Watson, Edward W., M.D., Physician to the Magdalene Home. 38 S. Nineteenth St.

1903. Weber, Charles H., M.D., Physician to the Dispensary of the Children's Hospital. 2048 Pine St.

1906. Weisenburg, Theodore H., M.D., Professor of Clinical Neurology and of Neuropathology in the Medico-Chirurgical College; Neurologist to the Philadelphia General Hospital; Consulting Neurologist to the State Hospital for the Insane at Norristown, and to the State Hospital for the Feeble-minded and Epileptic at Spring City. 2030 Chestnut St.

1883. Welch, William M., M.D., Chief Diagnostician to the Bureau of Health, and Consulting Physician to the Municipal Hospital for Contagious Diseases; Consulting Physician to the Northern Dispensary and the Northern Home for Friendless Children. 1411 Jefferson St.

ELECTED

1913. Wells, P. Frailey, A.M., M.D., Ph.D. S. W. Cor. Fortieth and Brown Sts.

1897. Wells, William H., M.D., Assistant Professor of Obstetrics in the Jefferson Medical College; Assistant Obstetrician to the Jefferson Medical College Hospital. 1135 Spruce St.

1893. Westcott, Thompson S., M.D., Associate in Diseases of Children in the University of Pennsylvania; Visiting Physician to the Methodist Episcopal Hospital; Assistant Physician to the Children's Hospital; Pediatrist to the Jewish Hospital. 1720 Pine St.

1884. Wharton, Henry R., M.D., Surgeon to the Presbyterian and the Children's Hospitals; Surgeon to Girard College; Consulting Surgeon to the Bryn Mawr Hospital, the Chestnut Hill Hospital, St. Christopher's Hospital for Children, the Pennsylvania Institution for the Deaf and Dumb, and the Pennsylvania Institution for the Blind. 1725 Spruce Street.

1901. White, Courtland Y., M.D., Director of the Pathological Laboratories of the Episcopal Hospital; Pathologist to the Children's Hospital and to the Kensington Hospital for Women; Chief Bacteriologist to the Bureau of Health, Department of Health and Charities, Philadelphia. 1808 Diamond St.

1878. White, J. William, M.D., Ph.D., LL.D. (Hon., Aberdeen), Fellow of the American Surgical Association and of the American Association of Genito-urinary Surgeons; John Rhea Barton Emeritus Professor of Surgery in the University of Pennsylvania. 1810 S. Rittenhouse Square.

1905. Whiteway, Harold M., M.D. 1924 Chestnut St.

1898. Whiting, Albert D., M.D., Surgeon to the Germantown Hospital; Assistant Surgeon to the German Hospital; Assistant Surgeon to the University Hospital; Instructor in Surgery in the University of Pennsylvania. 1523 Spruce Street.

1907. Williams, Carl, B.S., M.D., Ophthalmic Surgeon to the Germantown Hospital; Instructor in Ophthalmology in the University of Pennsylvania; Ophthalmic Surgeon to the Pennsylvania Institution for the Deaf and Dumb. School Lane and Greene Sts., Germantown.

1912. Willits, Charles H. A.M., M.D., Medical Director of the Provident Life and Trust Company of Philadelphia. Rittenhouse Hotel.

ELECTED

1902. Willson, Robert N., Jr., M.D., Pathologist to the Presbyterian Hospital; Assistant Physician to the Philadelphia General Hospital. 1827 Spruce St.

1881. Wilson, H. Augustus, M.D., Professor of Orthopedic Surgery in the Jefferson Medical College; Emeritus Professor of Orthopedic Surgery in the Philadelphia Polyclinic; Consulting Orthopedic Surgeon to the Philadelphia Lying-in Charity Hospital and the Kensington Hospital for Women; Orthopedic Surgeon to St. Agnes' Hospital. 1611 Spruce St.

1874. Wilson, James Cornelius, A.M. (Princeton), M.D., Emeritus Professor of the Practice of Medicine and of Clinical Medicine in the Jefferson Medical College; Physician-in-Chief to the German Hospital; Emeritus Physician to the Pennsylvania Hospital; Consulting Physician to the Bryn Mawr Hospital. 1509 Walnut St.

1902. Wilson, Samuel M., M.D. 1517 Arch St.

1897. Wilson, W. Reynolds, M.D. 1709 Spruce St.

1912. Winsor, Henry, M.D., Surgeon to the Dispensary of the Episcopal Hospital; Prosector to the Associate Professor of Applied Anatomy, and Assistant Instructor in Surgery in the University of Pennsylvania. 319 S. Sixteenth St.

1904. Wister, James W., M.D., Physician to the Out-patient Department of the Germantown Hospital. 5430 Germantown Ave.

*1901. Witmer, A. Ferree, M.D. Freeport, Long Island, N. Y.

1893. Wood, Alfred C., M.D., Assistant Professor of Surgery in the University of Pennsylvania; Surgeon to the University, the Philadelphia General, St. Timothy's, and the Howard Hospitals. 2035 Walnut St.

1900. Wood, George B., M.D., Instructor in Laryngology in the University of Pennsylvania; Assistant in the Clinic for Diseases of the Nose and Throat at the Polyclinic Hospital. 129 S. Eighteenth St.

1865. Wood, Horatio C., M.D., LL.D. (Yale and Lafayette), Emeritus Professor of Materia Medica and Therapeutics in the University of Pennsylvania; Associate Fellow in Medicine and Surgery of the American Academy of Arts and Sciences; Member of the National Academy of Science. 4107 Chester Ave.

1903. Wood, Horatio C., Jr., M.D., Professor of Pharmacology and Therapeutics in the Medico-Chirurgical College. 1905 Chestnut St.

ELECTED

1880. Woodbury, Frank, M.D., Secretary to the Committee on Lunacy of the Board of Charities of Pennsylvania. 218 S. Sixteenth St.

*1911. Woods, Andrew H., A.B., M.D., Neurologist to the Canton Hospital and to the Canton Hospital for Women; Acting President and Medical Superintendent of the Canton Christian College. Canton Christian College, Canton, China.

1901. Woods, Richard F., M.D., Assistant Surgeon to the Gynecean Hospital. 1501 Spruce St.

†1897. Woodward, George, M.D. W. Willow Grove Ave., Chestnut Hill, Philadelphia.

1913. Woodward, W. Wellington, M.D. 26 S. Church St., West Chester, Pa.

1903. Worden, Charles B., M.D., Associate in Diseases of the Stomach and Intestines in the Philadelphia Polyclinic; Physician to the Dispensary of the Presbyterian Hospital; Anesthetizer to the Orthopedic Department of the University Hospital; Physician to the Presbyterian Orphanage. 322 S. Sixteenth St.

1889. Young, James K., M.D., Professor of Orthopedic Surgery in the Philadelphia Polyclinic; Clinical Professor of Orthopedic Surgery in the Woman's Medical College of Pennsylvania; Associate Professor of Orthopedic Surgery in the University of Pennsylvania. 222 S. Sixteenth St.

1894. Zentmayer, William, M.D., Professor of Ophthalmology in the Philadelphia Polyclinic and College for Graduates in Medicine; Attending Surgeon to the Wills Eye Hospital; Ophthalmologist to the Glen Mills School. 1819 Spruce St.

1899. Ziegler, S. Lewis, A.M., M.D., Sc.D., Attending Surgeon to the Wills Eye Hospital; Ophthalmic Surgeon to St. Joseph's Hospital; Membre Société Française d'Ophtalmologie. 1625 Walnut St.

1887. Ziegler, Walter M. L., A.M., M.D. 1418 N. Seventeenth St.

1895. Zimmerman, Mason W., M.D., Consulting Ophthalmic Surgeon to the Germantown Hospital. 1522 Locust St.

ASSOCIATE FELLOWS

(Limited to Fifty, of whom Twenty may be Foreigners)

American

ELECTED

1911. Abbe, Robert, M.D. 13 W. Fiftieth St., New York City, N. Y.

1909. Billings, Frank, M.D., 335 E. Twenty-second Street, Chicago, Illinois.

1886. Cheever, David W., M.D., 557 Boylston Street, Boston, Massachusetts.

1893. Councilman, William T., M.D., Harvard Medical College, Boston, Massachusetts.

1909. Crile, George W., M.D., 1021 Prospect Avenue, S. E., Cleveland, Ohio.

1909. Dana, Charles Loomis, M.D., 53 West Fifty-third Street, New York City, New York.

1892. Emmet, Thomas Addis, M.D., 91 Madison Avenue, New York City, New York.

1903. Gorgas, William C., M.D., U. S. A., Washington, D. C.

1891. Jacobi, A., M.D., 19 East Forty-seventh Street, New York City, New York.

1912. McCaw, Lieut. Col. Walter D., M.D. Care of Surgeon-General's Office, Washington, D. C.

1909. Mall, Franklin P., M.D., 1514 Bolton Street, Baltimore, Maryland.

1906. Mayo, William J., M.D., Rochester, Minnesota.

1906. Pilcher, Lewis Stephen, M.D., 386 Grand Avenue, Brooklyn, New York.

1886. Reeve, John C., M.D., LL.D., S. W. corner Third and Wilkinson Streets, Dayton, Ohio.

1906. Shattuck, Frederick C., M.D., 135 Marlborough Street, Boston, Massachusetts.

1896. Sternberg, George M., M.D., U. S. A., 1019 Sixteenth Street, N. W., Washington, D. C.

ELECTED

1896. Tiffany, L. McLane, M.D., 831 Park Avenue, Baltimore, Maryland.
1909. Wadsworth, Oliver F., M.D., 526 Beacon Street, Boston, Massachusetts.
1894. Warren, J. Collins, M.D., 58 Beacon Street, Boston, Massachusetts.
1894. Weir, Robert F., M.D., 11 East Fifty-fourth Street, New York City, New York.
1892. Welch, William H., M.D., Johns Hopkins Hospital, Baltimore, Maryland.

Foreign

1890. Baccelli, Guido, Rome, Italy.
1908. Bannerman, W. B., M.D., Lt. Col. I. M. S., 11 Strathearn Place, Edinburgh, Scotland.
1894. Brunton, Sir T. Lauder, M.D., 10 Stratford Place, London, W., England.
1903. Finlay, Charles J., M.D., Havana, Cuba.
1899. Fraser, Sir Thomas R., M.D., LL.D., F.R.C.P., F.R.S., 13 Drumsheigh-Gardens, Edinburgh, Scotland.
1903. Horsley, Sir Victor Alexander Haden, F.R.S., 25 Cavendish Square, London, England.
1894. Jackson, J. Hughlings, M.D., 3 Manchester Square, London, England.
1893. von Jaksch, Rudolf, M.D., Prague, Bohemia.
1903. Kocher, Prof. Theodor, M.D., Berne, Switzerland.
1912. Lazarus, Paul, M.D., Hindersinstr. 14, Berlin, N. W., Germany.
1909. Macallum, Archibald B., M.A., M.B., Ph.D., Sc.D., LL.D., F.R.S., 59 St. George Street, Toronto, Canada.
1906. Myles, Sir Thomas, M.D., 33 Merion Square, W., Dublin, Ireland.
1896. Pye-Smith, P. H., M.D., 48 Brook St., London, W., England.
1898. Roddick, Thomas G., M.D., 80 Union Avenue, Montreal, Canada.
1908. Ross, Major Ronald, M.D., R.A., Liverpool School of Tropical Medicine, Liverpool, England.
1869. Valcourt, Th. de, M.D., Cannes, France.
1904. Waldeyer, Prof. Wilhelm, M.D., Berlin, Germany.

CORRESPONDING MEMBERS

ELECTED

1880. Carrow, Flemming, M.D., Washington Arcade, Detroit, Michigan.

1885. Rendu, Jean, M.D., Lyons, France.

NECROLOGICAL LIST

FELLOWS

WILLIAM R. DUNTON,	May 14, 1911
ORVILLE HORWITZ,	January 28, 1913
LEWIS W. STEINBACH,	February 10, 1913
ROLAND G. CURTIN,	March 14, 1913
GEORGE McCLELLAN,	March 29, 1913
ARTHUR A. BLISS,	May 1, 1913
LOUIS A. DUHRING,	May 8, 1913
RALPH S. LAVENSON,	July 6, 1913

ASSOCIATE FELLOWS

STAMFORD E. CHAILLÉ,	May 27, 1911
JOHN S. BILLINGS,	March 11, 1913
SIGISMUND JACCOUD,	April 26, 1913
SIR JONATHAN HUTCHINSON,	June 23, 1913
REGINALD HEBER FITZ,	September 30, 1913
CHARLES McBURNEY,	November 7, 1913

CORRESPONDING MEMBERS

KANNY LALL DEY,	August 16, 1899
DOMENICO CHIARA,	December, 8, 1905

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MEMOIR OF ROLAND GIDEON CURTIN, M.D.[1]

By SAMUEL D. RISLEY, A.M., M.D., Ph.D.

It is highly fitting that the College of Physicians should pause in its scientific proceedings to honor the memory of a distinguished Fellow and to enrich its annals with the record of a life singularly devoted to a realization of the lofty ideals for which this College has always stood.

Dr. Roland G. Curtin was born in Bellefonte, Centre County, Pennsylvania, October 29, 1839. He graduated Doctor of Medicine from the University of Pennsylvania March 14, 1866. His death occurred in Philadelphia March 14, 1913, on the forty-seventh anniversary of his graduation. His biography is the record of his preparation for a long and busy professional life and of a notable career characterized by great industry, opportunity grasped and improved, responsibility recognized, and bravely borne. A large, vigorous, genial, and impelling personality, he pursued a laborious course with unswerving fidelity, winning the loving confidence, as friend and physician, of both patient and professional colleague.

Dr. Curtin had been blessed with uniformly vigorous health until March, 1906. While dining at the house of a friend, a member of his University class, he suffered a sudden, alarming attack of pulmonary edema, which proved to be associated with the early stages of cardiovascular disease. This was followed at steadily diminishing intervals by succeeding attacks of varying severity, but each one threatening a fatal issue. The recurrences coming, as they did without warning, often in the night; the pain and distressing dyspnea; the advancing cardiovascular changes;

[1] Read November 5, 1913.

the ever-impending sense of danger extending through seven years would have been a sore burden for any patient; but when borne by a physician whose life had been in large measure devoted to the study and alleviation of allied affections, the burden must have been a grievous one, but was borne with inimitable fortitude, and with no murmur of complaint. As an indication of his courage, zeal, and untiring industry, it is noteworthy that during these gloomy years of trial and suffering, he did not relinquish his grasp upon the many affairs which for many years had claimed his attention.

During this time he served as President of the Philadelphia Medical Club; continued his active interest in the affairs of the Aid Association of the Philadelphia County Medical Society, of which he was President; collated and published statistics of heart disease from his extensive experience in public and private practice; prepared a paper on the "Climatology of Cancer;" wrote an extended paper on "The Superstitions of Precious Stones," and read it before the American Academy of Medicine; prepared and presented to the University Chapter of the Alphi Mu Pi Omega Medical Fraternity a paper on "The Medicine of the Greeks." He wrote also during this period "The Medical History of the Philadelphia Almshouse and Hospital from its Inception to 1854" for the Founders' Week Volume, an article requiring many weeks of patient historical research through the archives of Philadelphia and the minute-books of the institution, and at the time of his death was collecting data for a "History of Body-snatching in the United States" for the American Academy of Medicine.

His last action as President of the Aid Association, when he could no longer leave his room, was to prepare as a part of his President's report a scheme for the establishment, under the auspices of that Association, of a home for destitute physicians.

Dr. Curtin's father was Dr. Constans Curtin, of Dysart, County Clare, Ireland, a graduate of Surgeons' Hall, Dublin, who after serving in the British Navy emigrated to America in 1807, and in 1809 graduated from the Medical Department of the University of Pennsylvania.

His mother was Mary Anne Kinne, of New England, a lineal descendant of Thomas Welles, third Governor of Connecticut, and William Pynchon, Governor of Springfield, Mass.

Through this Irish and Puritan ancestry he was first cousin to Andrew G. Curtin, the famous war Governor of Pennsylvania, and also to Gideon Welles, the efficient Secretary of the Navy in President Lincoln's cabinet during the Civil War.

He had a laudable pride in his lineage, which he traced in unbroken sequence to a royal line; a pride which was an ever-present stimulus to live worthily and so fulfil the hope of his forebears for a noble and worthy posterity.

His education began in the schools of his native town, but at the age of sixteen years he entered Williston Seminary, at Easthampton, Mass., graduating in 1859. He then came to Philadelphia and began a business pursuit, which enterprise was of short duration, since in 1862 he was occupying a Government appointment as U. S. Naval Stores-keeper at the Philadelphia Navy Yard, a position which he filled until the close of the Civil War.

He then matriculated in the Medical Department of the University of Pennsylvania, receiving his medical degree in 1866, after which he was awarded the appointment of resident physician at the Philadelphia General Hospital. At the close of this two years' service he went abroad for travel and study. Soon after his return to the United States he was appointed Assistant U. S. Geologist under Professor F. V. Hayden, and accompanied him on an expedition to the Rocky Mountain region. In later years he often related incidents of the hardships endured and the perils encountered from hostile Indian tribes during that arduous service.

In 1869 he returned to Philadelphia and began his destined career as a physician. We find him speedily engrossed in the pursuits which were to claim his time and energy: endurance, love, and loyalty through the years to come.

In 1871 he was appointed clinical assistant in the Medical Dispensary at the University, then situated at Ninth Street

and Chestnut; Assistant Physician at the Lying-in-Charity on Cherry Street and Eleventh; Professor of Geology and Mineralogy at the Wagner Free Institute of Science, and matriculated for the lecture course at the University in the branches of Science Auxiliary to Medicine for which the degree of Doctor of Philosophy was conferred. It was in the midst of these early activities that I first met Dr. Curtin. I recall from the store-house of memories the man as first I knew him: A strong, sturdy, large frame; more than six feet in height, with a massive, noble, well-poised head; hair abundant and black as a raven's wing; a scant, dark beard and moustache not carefully trimmed; dark and kindly eyes; a cordial, frank manner; a sun-lit face; easily approached, but withal a commanding, trustful, and trustworthy personality. Our meeting was the dawn of an intimate friendship which continued through the vicissitudes of many years of busy, social, and professional life. For him it was the commencement of a long career of singular devotion to the best ideals of private and professional life. The requirements of his private practice grew more and more exacting with each succeeding year and the demands of public station increased. When the University moved to West Philadelphia and the University Hospital was established he became in succession chief of the Medical Clinic, Assistant to the Professor of Clinical Medicine in the out-door Medical Department of the University, Lecturer on Physical Diagnosis and Physician to the University Hospital, filling the latter position from 1887 to 1896. He was for many years, beginning with 1887, visiting physician to the Presbyterian Hospital of Philadelphia and a member of the Visiting Medical Staff of the Philadelphia Hospital. He was also for a long period physician to the Howard and the Maternity Hospitals; was one of the founders and for many years a member of the Board of Directors of the Midnight Mission; Consulting Physician to the Rush Hospital for Consumptives and to the Douglass and St. Timothy's Hospitals; was Assistant Medical Director of the Centennial Exhibition in 1876, and a member of the Committee of Arrangements for the International Medical Congress, which met in Philadelphia that

year; was Vice-President of the Section on Climatology of the International Congress which convened in Washington, D. C., in 1887. At the World's Congress at Chicago in 1893, Auxiliary to the Columbia Exhibition, he delivered the address of welcome to the foreign delegates, and was Honorary President of the Medico-Climatological Division of the Congress. He was present and took an active part at the meetings of the Pan-American Medical Congress convening successively in Washington, Havana, Mexico City, and Panama; was President of the Medical Board of the Philadelphia Hospital; of the Association of Hospital Surgeons and Physicians of Philadelphia; of the Grand Chapter of the Alpha Mu Pi Omega Medical Fraternity of the United States, of which he was one of the founders; of the American Climatological Society; of the Philadelphia County Medical Society, and of the Philadelphia Medical Club.

He held membership in the Philadelphia County Medical Society, the Medical Society of the State of Pennsylvania, the American Medical Association, the American Academy of Medicine, and the Philadelphia Obstetrical and Pathological Societies, and was a Fellow of the College of Physicians of Philadelphia. He was also a member of many other societies and associations: The Institute of Art, Science, and Letters; the American Social Science Association; the Genealogical Society of Pennsylvania; the Scotch Irish Society; the New England Society of Pennsylvania; the Sons of the American Revolution; the Naval Veterans; the Grand Army of the Republic; the Pennsylvania Forestry Association; a life member of the Academy of Natural Sciences and President of the Aid Association of the County Medical Society. He was Past Master of his Masonic Lodge, a Knight Templar, and a member of the Scottish Rite; a member of the Union League and the Art Club of Philadelphia.

He was a member of and always took an active interest in the various Alumni Organizations of the University of Pennsylvania, and was a member of the Board of Directors of the General Alumni Society; he was also Historian of the Alumni Society of the Medical Department, and was a Phi Gamma Delta.

It is worthy of note that he was not an idle member of these organizations, but invariably took an active interest in their proceedings and a place of leadership in forming their policy and in the conduct of their affairs. This made of his house a meeting place for innumerable committees, and his counsel was sought on all sorts of subjects connected with the interests of the organizations of which he was a member. A few weeks before his death he was deeply moved when informed that the Philadelphia Alumni Society of the Medical Department of the University of Pennsylvania had resolved to create a Roland G. Curtin Scholarship at the University to be awarded to the sons of physicians, alumni of the University, desiring to study medicine.

The mere catalogue of his public activities is amazing. The annual, monthly, and weekly meetings; the time and energy required to keep in touch with their proceedings or to prepare for intelligent participation in the scientific or sociologic work set forth in the regularly recurring program was, it would seem, a sufficient task for a life-work. The amazement, however, is emphasized when we scan closely the nature of the work required by many of these appointments. The hospital positions, staff and teaching appointments required not only preparation for the daily and weekly lectures, but many hours daily in actual clinical work. Dr. Curtin was not a fluent speaker, but his class lectures were models of clear, concise, and accurate marshalling of facts collated from an extensive experience, and the interpretation of their significance by an unswerving process of inductive reasoning. This was done with such marked efficiency that his reputation as a safe teacher, an astute diagnostician and therapeutist was second to no other, even in a city justly renowned for its great physicians.

His reputation and skill soon added to his public work a large private practice not only as a family physician but as a helpful and trustworthy consultant.

Many have sought for some adequate explanation for the career of almost singular eminence which was accorded to Dr. Curtin as demonstrated by his large clientele; the affectionate

regard of his professional colleagues and patients; the unwavering confidence reposed in him as a man and as a physician; the multitude of friends, both lay and professional, in all walks of life; rich and poor alike, eminent or unknown.

He moved in the realm of his appointed daily tasks, without ostentation, calmly and without haste. There was no weak seeking for effect; indeed, his demeanor was often one of apparent indifference to the opinions of others so far as they might concern himself. In the midst of the serious and often thrilling scenes of threatened tragedy to human life which come alas so frequently to every physician, he seemed unconscious of the tragic features and maintained his intellectual poise. In the last analysis we shall find that this attitude, which was character, was the fruitage of his generous, untiring work. There is something, difficult to define, that comes into the character and is revealed in the face of only the man who works with no thought of self.

> "The busy world shoves angrily aside
> The Man who stands with arms akimbo set,
> Until occasion tells him what to do;
> And he who waits to have his tasks marked out
> Shall die and leave his errand unfulfilled."

From these multitudious works we have seen the man come forth, the man we knew; the calm, sober man created by contact with the serious tasks of life.

Dr. Curtin has been called the doctors' doctor, in recognition of the frequent calls to physicians and their families and for his help in times of difficulty and anxiety in their professional work.

It was, however, as a consultant that the peculiarly helpful, forceful, and kindly character was manifested. An example by way of illustration may be an aid to correct protraiture. The widow of a clergyman brought her only son, aged sixteen years, for defective vision. The unusual condition of the intra-ocular circulation suggested some peculiar cardiac disturbance. Dr. Curtin's opinion was asked for. He came, was told of the ocular conditions, and asked a few questions of the mother and the boy; placed his ear to the chest, then turning to the mother asked,

"Was this young man a blue baby?" The mother replied, "Why, yes." The mask and the demeanor of the diagnostician were almost visibly laid aside and the sympathetic friend, the wise counsellor, and physician revealed: comprehending at a glance that this aging, loving, widowed mother, with hopes built high, clustering about the future of an only son, must end in disappointment. Then followed a clear, concise statement of conditions, kindly advice for his future course of life, and a prognosis which proved a prophecy of insufficiency.

A wise, thoughtful, and learned physician, a brilliant diagnostician, a therapeutist of sound judgment ripened by large experience, he became a helpful and generous consultant; his professional life and conduct being based upon the highest ideals of honor and integrity to both patient and physician. For him ethics was the normal fruitage of a sound character. As years advanced many sought his counsel, but none went empty-handed away.

Notwithstanding the constant evidence of a thoughtful and grave foundation for life and conduct, Dr. Curtin was not a man of grave demeanor. The influence of his Celtic origin found unfailing expression in a rare, inimitable, and quite characteristic wit and humor which burst forth on occasion free from venom, pure as a bubbling spring; a story to fit every occasion and told with a rare skill. But through this vein of humor could be discovered a gravity; a pathos borne of a race who, for generations oppressed, ate their food in sorrow and "salted it with their tears."

The great opportunity for observation afforded by his hospital appointments and large private practice gave to him a deep insight into the facies of disease, so that his ready and unerring diagnostic skill seemed like an intuition. As a result of this vast experience, an analytical mind such as his, formed clear and definite opinions as to the nature, etiology, and treatment of disease. Having reached what to his mind seemed a logical conclusion, he relinquished his opinion only after the most convincing demonstration of error. Since his life-work extended from one generation into another, including the years of marvellous evolu-

tion, not to say revolution in our knowledge of the causes and nature of disease, growing largely out of laboratory revelations, he had much mental turmoil and struggle in the effort to reconcile the old to the new views. But in most respects his sincere love of the truth led him to triumph even though it meant the abandonment of former opinions. No stronger evidence of his essential greatness could be cited than his mental struggle maintained through these years of evolution in the medical thought of the time.

No appreciation of the man can be complete which does not consider the immaterial foundations upon which was builded so wholesome a superstructure. A reviewer has said of Watt, the monumental painter of England, that his motto or profession of faith was "that all that is best in the lives of men is that which has no material reality."

To those whose acquaintance with Dr. Curtin was casual such a profession of faith might not seem applicable, but those to whom the revelation of the real man was accorded, will know. I found on the wall of his room this framed quotation from Emerson, "I awoke this morning with devout thanksgiving for my friends, the old and the new," and clustered about it on the wall were the shadows of many friends.

To visit Dr. Curtin's clinic for out-door patients at the University Hospital was not only a great opportunity but an inspiration for the medical student or young physician. The arranged settees crowded with the sick, often unsavory, poor, each bringing his plaint or complaint, was a familiar scene to most medical men. But Dr. Curtin was the presiding, inspiring genius of the place and occasion. Each story as given by these needy folk found a ready and sympathetic hearing and prompt, kindly advice. Their distress was never emphasized by unkind word or act. The work as such was hard, but by some subtle influence was transformed into a ministry of service which, reacting upon the ministrant, he became as one, all unconscious to himself, who had seen a vision, and out of the vision grew his kindness to the patient, his love for the medical student and the young doctor,

and his desire to help and direct them in their preparation for a like service. Little wonder that they became his trustful friends.

Dr. Curtin lived a bachelor until 1882, when he married Julia Taylor, widow of John S. Robinson, of Hartford, Conn. There were two children by this marriage, Roland G., who died in infancy and Mary Constans Curtin, who survives him. Mrs. Curtin died March 18, 1904; a sore bereavement which weighed heavily upon Dr. Curtin, the tenor of whose life ever afterward seemed pitched in a minor key.

His contributions to medical literature were in the form of papers presented to the various medical societies of which he was a member and appeared later in their transactions or in medical journals. These contributions were numerous, and were characterized by the evidence they afford of extensive experience, close observation, and accurate interpretation of the phenomena of disease. Many of his papers have been widely quoted by other authors. He had many of the characteristics of the antiquarian and collector. His collection of Book Plates was extensive, and probably one of the most valuable and important in this country. The walls of his bungalow at Bear Lake were adorned by Indian arrow-heads, curious examples of antiquated fire-arms and other weapons, a large collection of paddles of different models employed by the various Indian tribes to propel their canoes, and the harpoons of various patterns employed in the capture of the whale during the exciting days of that industry.

No biography of Dr. Curtin would be sufficient that did not include his life during the annual vacation period spent with his family in the bungalow on the shore of Bear Lake, in Luzerne County, Pa., eighteen miles from the line of the Lehigh Valley Railroad at Glen Summit. For twenty-seven years the month of August was passed at this quiet haven in the pure mountain air far from the distractions of the city, and free from the toil, anxiety, and exactions of his busy professional life. The restful, fleeting days passed all too rapidly, but were not permitted to pass in idleness. A peculiar, but quite characteristic restlessness drove

him to constant activity. Clad in knickerbockers, he could be found at stated daily intervals attending to the care and culture of the trees and flowering shrubs which, at great inconvenience and sacrifice, he had planted, but which, owing to the hostile winters in that mountainous region, gave but scanty return for his loving care.

He had a mania for newspaper clippings. Throughout the year any piece of noteworthy information thrown in by an editor to fill an otherwise empty fraction of a column in the paper was cut out, thrown into a common receptacle, and was finally found at "Dysart," there to be sorted, rudely classified, and pasted into scrap-books. These stacks of books, the accumulation of years, formed a curious sort of encyclopedia of useless information; stale jokes, quips and quirks, and humorous anecdotes: a curious resetting of nuggets of wisdom; or of the fun, faults, foibles, and fables of mankind, filched from the literature of the ages; passages possibly from the book of the Good Counsels of India written thirteen centuries before the Christian era, or from the Talmud or from George Ade. But the occupation it afforded him was useful, since it gave him pleasure and freedom from care.

He was a victim of the solitaire habit, as many men of renown have been. With infinite patience for hours he would find repose and occupation in this amusement like a child with its blocks and toys.

The bungalow resting on the shore of the beautiful lake was "Dysart," named in honor of the ancestral home in Ireland. A great "log-book" had been kept through the passing years, written by the hands of many friends, who had as guests participated in the passing joys of a simple but generous hospitality. So the "log" became at once a guest-book and a history of events at "Dysart;" its pages the record of joys and, alas, of sorrows! of flashes of genius, with pen or pencil to illumine the commonplace; but above all a story of peace, good-will, and happiness covering the passing years. In it some genial hand had dubbed his host "The Laird of Dysart," and again compliments for the "Queen of Dysart," as a charming hostess, and later a sorrowful

note is sounded in the statement that the "Queen no longer reigns." He had collected at "Dysart" a quite satisfactory library of information on natural history subjects and found much pleasure in the endeavor to name and classify unfamiliar flower or shrub, butterfly or moth, a snake or fish, and came to have the reputation for universal knowledge among the surrounding country folk, who brought all sorts of curious objects to him for study and all sorts of ailments for treatment, which amused him greatly; but he never seemed conscious of the fact that they sought excuse for calling on the "*great man*," who always greeted them with such kindness and consideration. Many came for counsel and comfort, as to the clergyman; and so as the years passed he became the Solon and the Thoreau for the countryside.

The lake itself, with its ever-varying moods, was an unfailing source of delight to him; often revealing to his guest his scientific habit of mind as he sought to explain its shifting meteorological phenomena; and often, too, his love for the beautiful as he looked out upon the pageant of water and landscape spread out before him in the sun and shade. We had on one occasion climbed the mountain side to gain a more extended view. Turning we stood with uncovered head while silence fell between. The note of a bird would have seemed an intrusion.

The beauty and grandeur of the mountain scene lay spread out before; below, the lake, resting placid in the bosom of the hills; its remote border mirrored the mountain and forest beyond; its calm surface reflecting the blue dome of the sky, seemed a royal sapphire in the emerald setting of the hills. We stood silent, then with brimming eyes he turned away and said, "Let us go down."

Time wrought the inevitable change: sapped his vigor, whitened his hair, and engraved upon his face and form the record of the years, and at last pierced him with pain, but could not embitter his heart, deprive him of his dauntless courage, or steal from him his love or his friends. Faith, sentiment, friendship, love, honor, patriotism continue when material things have passed away.

The character portrait of any notable life can be seen or adequately interpreted only when placed in proper light. The great west window of St. James' Church, where Dr. Curtin was a devout worshipper, is a splendid idealization of the Te Deum; but to see and realize its beauty, one must stand in the heart of the nave when the window is flooded by the light of the westering sun—it then bursts into a vision of glory! It is so with truly great lives. They must be exposed to the gleaming, significant light of an Easter morning; then and only then do we understand that they cannot be measured by the calendar of time, nor confined to the narrow limits of three score years and ten. Then and only then do we see that the voyage of life has not been across a shore-lined lake, but over the bay, across the bar, and finally out upon the limitless expanse of the great sea to a haven from which no voyager e'er sails away.

Tonight, Fellows of the College, we add another luminous figure to our galaxy of noble men who, in the remote and near past, have gone to their reward, having added luster to the professional renown of our city and honored this College by their loyal service to mankind!

MEMOIR OF CHARLES AUGUSTUS OLIVER, M.D.[1]

By McCLUNEY RADCLIFFE, M.D.

Dr. Charles Augustus Oliver was born in Cincinnati on December 14, 1853, and died April 8, 1911, of uremia, due to chronic interstitial nephritis. He came of an old and distinguished family, being the son of Dr. George Powell Oliver, who was the founder and first President of the Medico-Chirurgical College in Philadelphia.

His early education was received in private schools, but later, when his father removed to this city, he was sent to the Central High School, where, in 1873, he received the degree of Bachelor of Arts, with the subsequent degree of Master of Arts, in 1878. The honorary degree of Master of Arts was conferred upon him by Lafayette College in 1896.

His medical education was obtained at the University of Pennsylvania, from which institution he was graduated in 1876. His thesis, which was then required, was on "Opium *vs.* Belladonna," and on which he was awarded honorable mention.

He spent the following year, 1877–1878, as Resident Physician in the Philadelphia Hospital. One year later he became connected with the Wills Eye Hospital as Clinical Clerk in the services of his teacher, the late Prof. William F. Norris. At this institution he remained uninterruptedly, serving with distinguished ability, until his death, having been elected Attending Surgeon in October 1890.

He helped establish the clinical services upon diseases of the eye at St. Mary's and St. Agnes' Hospitals, being elected Ophthal-

[1] Read December 3, 1913.

mic Surgeon to the former in 1883, and to the latter in 1888; and upon his retiring from active service in these institutions, he was made Consulting Ophthalmologist. In October 1890, he was elected Ophthalmic Surgeon to the Presbyterian Hospital, which position he held at the time of his death.

In 1894 he was elected Ophthalmic Surgeon to the Philadelphia Hospital, which institution, with its large operative service, he continued to serve with untiring fidelity until his death.

He was Consulting Ophthalmologist to the Friends' Asylum for the Insane at Frankford, and to the State Hospital for the Chronic Insane at Norristown. In 1897 he was made Associate Clinical Professor of Ophthalmology in the Women's Medical College of Pennsylvania, being promoted to the full Clinical Professorship in 1906, a position in which he took a most active interest, and held until 1909.

His main publications are a "Text-Book of Ophthalmology," written in collaboration with his teacher, the late Prof. William F. Norris. This work was translated into Chinese and used in medical teaching throughout China. His most noted editorial work was the supervision of the four volumes of Norris and Oliver's "System of Diseases of the Eye," to which more than sixty American, British, Dutch, French, German, and Spanish authors contributed. His monograph upon "A Description of Some of the Most Important Ophthalmic Methods Employed for the Recognition of Peripheral and Central Nerve Diseases," was translated into French by Baudry, of Lille, and into German by Wolff.

He translated and edited the English edition of Ohleman's "Ocular Therapeutics," Baudry's "Injuries to the Eye in their Medico-Legal Aspect," and Donder's "Essay on the Nature and the Consequences of Anomalies of Refraction." He also prepared the chapter on "Paracentesis, Keratotomy, Conjunctivoplasty, and Some Other Operations on the Cornea," for Wood's System of Ophthalmic Operations."

Editorially, he was connected with the well-known Ophthalmic Quarterly, "Ophthalmology," and Anales de Oftalmologia."

He was also a collaborator for "Annales d'Oculistique," and co-editor of the "Ophthalmoscope" from 1903 to 1908. His monographs, magazine articles, reviews, abstracts, etc., embrace several hundred subjects. Some of the more important are: "A Correlation of Color Perception;" "A New Series of Metric Test Letters and Words for Determining the Amount and Range of Accommodation;" "The Eye of the Adult Imbecile;" "Description of a Series of Tests for the Detection and Determination of Subnormal Color Perception;" "A Series of Wools for the Ready Detection of Color-Blindness;" "The Relation of Ophthalmoscopic Findings to Disease of the Central Cortex, as Illustrated by a Series of Observations upon Nearly Two Hundred Cases of Epilepsy and General Paralysis of the Insane;" "A Study of the Ophthalmic Changes in Chlorosis, Pernicious Anemia, and Leukocythemia;" "Clinical Study of the Ocular Symptoms Found in So-called Posterior Spinal Sclerosis;" "Description of a New Method for the Implantation of Glass Balls in Ténon's Capsule;" "A Modification of the Abney Pellet Test for the Ready Detection of Central Scotomata;" "Description of a Single Stitch Operation for Advancement of the Exterior Ocular Muscles;" "A Study of the Nativity, Sex, and Age, Occupation and Social Condition of Three Thousand Four Hundred and Thirty-six Cases of Senile Cataract Operated Upon at the Wills Hospital in Philadelphia," and the article on "Cataract," in connection with the reader, for Sajous' "Analytical Cyclopædia of Practical Medicine."

Among his memberships in medical societies may be mentioned those in the Philadelphia County and Pennsylvania State Medical Societies; the American Medical Association; the Wills Hospital; Ophthalmic Society, of which he was the founder; the American Ophthalmological Society; Fellow of the American Academy of Medicine; and Fellow of the College of Physicians since 1884. He was also a member of the American Philosophical Society; The American Association for the Advancement of Science; The General Society of the War of 1812; Companion of the Military Order of Foreign Wars of the United States; and

of the Military Order of the Loyal Legion of the United States; and of the Ohio Society of Philadelphia.

His honorary and corresponding memberships extended over many foreign medical and scientific societies, including the Ophthalmic Section of the British Medical Association; the Sociedad Medica, Argentina; Societe Medico-Chirurgicale de Liége, Belgium; Société Française d'Ophtalmologie; Ophthalmologischen, Gesellschaft, Heidelberg; and the Sociedad Oftalmalogica, Hispano-Americana, Spain.

He was also a member and Honorary Vice-President, Section on Ophthalmology of the Fifteenth International Congress of Medicine, Lisbon, Portugal, in 1906; and also a member, and Honorary Vice-President of the Section on Ophthalmology of the Sixteenth International Congress of Medicine, Buda-Pest, Hungary, 1909.

Dr. Oliver was of a genial disposition and thoughtful of his friends. As a student, he was painstaking and a master of details, not only in his private work, but in his public clinics, as evidenced by his voluminous histories, not the slightest symptom escaping his notice.

As a teacher, he was thorough, kind, sympathetic, and watchful of the interests of his students.

As a clinician, he was accurate in his diagnosis, and conservative in his prognosis and treatment, following closely in that respect in the footsteps of his renowned teacher.

He was a successful but conservative operator, being particularly expert in the plastic surgery of the eye, in which his results were most gratifying.

He was zealous for the advancement of ophthalmology in Philadelphia, not from a narrow, selfish point of view, but on the broad basis of civic pride. He frequently expressed to me his views of the methods that should, in his opinion, be adopted to advance and broaden the influence of medicine, and especially ophthalmology, as taught and practised in this city. His chief thought was that Philadelphia should continue to be known and recognized as the leading medical centre in this country.

I found among his papers an immense amount of data, which he was collecting for a systematic work on ophthalmology, and which, no doubt, would have been completed had his life been spared.

Dr. Oliver travelled extensively, visiting many of the most important foreign clinics and hospitals, and was ever on the alert to profit by the latest scientific advances in ophthalmology.

No doubt it will be surprising to many, if not all, of his medical friends, to learn that in his boyhood he devoted considerable attention to music, and was engaged for a time in teaching it, but gave it up when he entered the Central High School in order to devote his entire attention to his studies preliminary to medicine.

He was just reaching the zenith of his success and reaping the rewards of his unremitting toil, when his physical and mental abilities were undermined by the insidious disease which finally proved fatal. As the Prophet has so beautifully expressed it, "His sun is gone down while it was yet day." And now that his spirit has left us, the kind thoughts of hosts of friends follow him to that Celestial Country where at last shall be found—

"The day that hath no evening,
The health that hath no sore,
The light that hath no ending,
But lasteth evermore."

BRIEF REMARKS APPROPRIATE TO THE CENTENNIAL ANNIVERSARY OF THE DEATH OF BENJAMIN RUSH, M.D., ONE OF THE FOUNDERS OF THE COLLEGE[1]

Who Died in Philadelphia, April 13, 1813

By JAMES C. WILSON, M.D.,
PRESIDENT OF THE COLLEGE

The name of Benjamin Rush appears in the list of the Senior Fellows published with the Constitution of the College in the *Pennsylvania Packet and Daily Advertizer*, February 1, 1787. He was an active Fellow of the College from that period until November 5, 1793, when he tendered his resignation in a brief note accompanied with the gift of a copy of Wallis' edition of the works of Sydenham. His resignation was accepted and the secretary directed to thank him for the gift of books. This occurred at the height of the great epidemic of yellow fever and has been attributed doubtless correctly to differences between Dr. Rush and other Fellows of the College in regard to his treatment of cases of that disease. The history of that terrible period in the annals of our city is well known. It is also well known that Rush was impatient of opposition, and that it pleased him better to withdraw from controversy than to continue in association with those with whom it was impossible for him to agree.

To his contemporaries, he was a man not unlike other men, having his virtues and his faults, a good citizen, a skilful physician,

[1] Read November 5, 1913.

kindly, courteous, benevolent, but having upon occasion much fight in him. He was even known to have much fame in distant lands, chiefly on account of a wonderful, clear narrative of the bilious yellow fever of 1793 which he had written. To us who see him through the vista of a hundred years, he stands not indeed the most conspicuous figure of a time brilliant with heroic men and deeds, but great among the greatest and surely the most striking and impressive figure of the medical life of America at that period or any period since. His death at the age of sixty-eight found him as always devoted to the welfare of his fellows, healing the sick, teaching, absorbed in public affairs, busy with his pen. It created a profound impression not only in Philadelphia but throughout the United States and in Europe. He was essentially a man of the people and was as widely loved as he was widely known. He was universally and sincerely mourned.

> "Nothing is here for tears, nothing to wail
> Or knock the breast; no weakness, no contempt,
> Dispraise or blame: nothing but well and fair,
> And what may quiet us."

Under the leadership of the late Dr. Gihon, but not until after Dr. Gihon's death, the American Medical Association erected June 11, 1904, upon the grounds of the Naval Museum of Hygiene, at Washington, D. C., and with proper ceremonies presented to the nation a bronze statue of Benjamin Rush, as an enduring memorial of one who exemplifies in an unusual degree the ancient maxim, "*Dii laborbus omnia vendunt.*"

This monument, the gift of the profession, of which he was so illistrious a member, to the nation, whose greatness he foresaw and predicted, bears upon its pedestal four legends, commemorative of his learning, his patriotism, his sagacity as a specialist, and his greatness as a physician and a man. These are Studium sine calamo somnium; Signer of the Declaration of Independence; the First American A'ienist; and Physician and Philanthropist.

In September, 1910, Dr. Robert Abbe, of New York, came into possession of a very valuable relic, namely, the watch carried by Dr. Rush in the latter years of his life. Descending through the

son and grandson of Rush, this watch became the property of his great granddaughter, Mary Theresa de Beelen Rush, who married the Rev. Richard L. Howell, who survived her and later married Miss Gwendolen Whistler, who survived him and presented it to Dr. Abbe, who promptly presented it with other small personal effects to the College of Physicians under the following conditions:

"The mementos of Dr. Rush are to remain in the Cabinet and keeping of the College of Physicians of Philadelphia.

"A Custodian shall be chosen from among the members of the profession who most represents the high traits of character which made the memory of Dr. Rush so honored.

"The chosen Custodian shall nominate another eminent man who will succeed to the same honor, during life, or at the former's death.

"If the succession lapses from failure to nominate, then, the President of the College and two members of the board of trustees chosen by him shall select a successor.

"It would seem wise for each Custodian to choose a successor from a city not his own and that the transference should be at reasonably long intervals."

The Custodian named by Dr. Abbe is Dr. S. Weir Mitchell. The successor nominated by Dr. Mitchell was Dr. J. S. Billings, as was found when at the request of Dr. Mitchell after the death of Dr. Billings the envelope was opened. Dr. Mitchell then placed with the college an envelope which remains sealed.

These relics have been placed upon the table for the inspection of the Fellows of the College.

THE HOSPITALS AT GETTYSBURG[1]

By S. WEIR MITCHELL, M.D.

The surgeon, who is also both physician and surgeon, is becoming more and more an important person in modern warfare—in fact, far more largely important than he could ever have been in the wars of the past, where his services were confined to individual men. Now he is able to dictate hygienic measures on a large scale, and thus materially to affect the fate of nations and of wars.

It may also have occurred to some of you, as it has to me, to observe that in the books about the history of the Civil War and the endless number of autobiographies of soldiers, allusions to the surgeon and his great services are unimportant, and sometimes do not exist at all. And yet, never in the history of war up to that time was the surgeon as competent—and so largely competent—as he then became. A great book might be written on the surgeon in war from the time of the Romans to the present date.

As our profession has been thus neglected in the books of war, it has been elsewhere treated with equal indifference or neglect. I do not know of a single monument to a surgeon of the Civil War on either side erected by a State or by the United States.

Last spring I had the pleasure of spending two days on the battlefield of Gettysburg, with men who had all been in the great Civil War of the Sixties. On this field every artillery station is noted by tablets, and the important points are beauti-

[1] Read January 1, 1913.

fully marked with hundreds of bronze shields recalling names now famous in history or important in that battle. I observed, however, that there was not a single memorial of a surgeon, and yet on the field of Gettysburg thirteen surgeons were killed or wounded. How many suffered on the Confederate side I have been entirely unable to ascertain, but it is interesting to note that they left eighty surgeons with their wounded. These gentlemen served until sufficient aid came from the cities of the North, and then were sent home across the lines to their own army. The policy of considering the surgeon as a non-combatant and treating him so when made prisoner was not always followed throughout the Civil War. I have not been able to trace its whole history, but it would be interesting to know.

After observing the want of memorials to those surgeons who fell on the field, I made an appeal both to the Surgeon-General of the Army and to Lieut. Colonel Nicholson, Head of the Gettysburg Park Commission, in regard to this failure to commemorate our services. This has resulted fortunately in having marked by a stake all the corps hospitals on our side and also the position of the Confederate hospitals. I learn now that this will be followed up by placing bronze shields wherever such a hospital was found to have existed, and an effort will be made to place on these shields the names of the surgeons in charge of the said hospital. Thus, for the first time, there will be a national memorial to the surgeons of the Civil War.

Knowing how many of our Fellows served in that great conflict, I feel sure that what I have said to you will not be without interest and that you will feel glad with me that I was enabled, without troubling others, to effect this interesting purpose.

I present to the College the maps made at my request by the Gettysburg Park Commission or sent from the Surgeon-General's office, and certain other documents connected with this matter. These should all be kept together, in order that some future historian of our medical and surgical share in the great war may find in our library this available material.

THE ANNUAL ADDRESS OF THE PRESIDENT[1]

By G. E. de SCHWEINITZ, A.M., M.D.

In my two previous addresses I presented a review of the most important events in College activities during the preceding year, together with a résumé of such other details of our business as it seemed to me should be of interest to the Fellows. This plan I shall follow in my remarks this evening.

Concerning the Scientific Business of the College. In addition to the nine stated meetings and one special meeting which have been held from December 1, 1911, to November 30, 1912, I may refer to the December meeting of the same year, therefore to eleven meetings in all. During this period of time thirty-six papers have been read, as follows: Twenty-seven strictly scientific papers, three memoirs, two addresses on special subjects, and four addresses in connection with formal portrait presentations. The memoirs were those of Dr. A. O. J. Kelly, prepared and read by Dr. James Tyson, of Dr. John B. Shober, prepared by Dr. Chas. B. Penrose and read by the Secretary of the College, and of Dr. John H. Musser, prepared and read by Dr. George A. Piersol.

On the evening of February 26, 1912, a special session of the College in conjunction with the Section on General Medicine took place, and was interesting not only because for the first time in our history a joint meeting of the College and its most important Section, namely, that on General Medicine, occurred, but because the audience heard an extremely valuable address

[1] Read January 1, 1913.

"On Some Newly Discovered Letters of William Harvey," by Dr. S. Weir Mitchell, an address which has since, through the generosity of Dr. Mitchell, been separately printed and distributed to the Fellows of the College and to the most important libraries of the world.

At the November meeting of the College, on the occasion of his presentation of the beautiful bust of Galen which now graces this Hall, the donor, Dr. Richard H. Harte, delivered an entertaining historical address on the life and work of this great man, who, as the learned Hirschberg has said, "is the link between the medicine of the past and the medicine of the future, and the triumph of whose achievements has outlived the changes of fifteen centuries."

All of the scientific papers were well worth the close attention which they commanded. To some of them I may be permitted to call special attention, namely: The unusually interesting work of Dr. George Norris and Dr. George Fetterolf in their research on "The Anatomical Explanation of the Relatively High-pitched and Less Resonant Percussion Note Normally Found at the Pulmonary Apex on the Right Side," and on "The Topography of the Valves of the Heart as Shown by the *X*-rays."

The February meeting was particularly illuminating because of a series of papers concerning epilepsy: An introduction by S. Weir Mitchell, an address on the medical treatment of this disease by Dr. W. T. Shanahan, and a discussion of the malady from the surgical standpoint by Drs. Charles H. Frazier and William J. Taylor, the former surgeon making a clear demonstration of his operative experience and technique with the aid of a series of well-prepared lantern slides. The paper of Dr. Charles K. Mills on "The Mechanism of Emotional Expression and its Organic Basis," illustrated, as it was, with admirable moving pictures, demonstrated by Dr. T. H. Weisenburg, the discussion being effectively opened by Dr. George McClellan, created a lively interest. The "Functions of the Anterolateral Columns of the Cord" were well described in the report of a research by Drs. Williams Cadwalader and J. E. Sweet, and at

the same meeting Dr. Edward Martin and Dr. William G. Spiller recorded the case history of a patient with disease of this column on whom the operation of its division had been performed, with the result that pain was relieved. The very large experience of Dr. Robert S. McCombs in illuminating gas poisoning was the subject of a paper presented, on invitation, by himself and Dr. M. Howard Fussell. Dr. Hobart Amory Hare's additional report and résumé of his well-known and extensive experience in "The Treatment of Aortic Aneurysm by Wiring," and Dr. James E. Talley's review of "The Effect of Atropin on the Pulse-rate on Various Conditions of the Myocardium," were subjects of unusual interest. It goes without saying that Dr. Deaver's report of "A Year's Work in Appendicitis" and of "Five Hundred and Thirty-four Operations on Carcinoma of the Mammary Gland" represented an amount of statistical and surgical work of great importance.

On the evening of April 29, 1912, the Public Lectures of the College of Physicians were continued in one entitled "Superstition and the Doctor," delivered by Mr. Owen Wister. A large audience greeted the lecturer, and all those present were more than delighted with his scholarly address, punctuated with quaint bits of humor in a manner peculiar to its talented author.

During the last three years six of these public lectures have been given, and their inauguration by the College at the suggestion of Dr. S. Weir Mitchell at the January, 1910, meeting was a happy event. I venture to hope that in future years they will continue, because I believe, as has been said in a previous address, that they have served in a perfectly proper manner to focus as never before in our history the attention of the citizens of this municipality upon the College and its worth, work, and influence.

On the evening of March 29, 1912, Dr. William H. Howell, Professor of Physiology in Johns Hopkins University, delivered a Weir Mitchell Lecture on "The Factors Concerned in the Coagulation of Blood and Their Variations under Pathological Conditions," to the great satisfaction of his hearers. The second Weir Mitchell Lecture of the year, on October 21, 1912, by Pro-

fessor G. H. F. Nuttall, of the University of Cambridge, England, on "Some Recent Advances in our Knowledge of the Mode of Spread of Protozoal Disease," discussed a subject of ever-increasing interest at the present time.

That the work of the Weir Mitchell Lecture Committee has met with success the College will surely grant. Beginning as these lectures did with one by Arthur R. Cushny, Professor of Pharmacology in the University of London, and continuing in those given by Edmund B. Wilson, Professor of Zoölogy in Columbia University, Svante Arrhenius, the distinguished Director of the Nobel Institute in Stockholm, William T. Porter, Professor of Comparative Physiology in Harvard, and concluding with those to which reference has been made this evening by Dr. William H. Howell and Professor G. H. F. Nuttall, they surely have furnished the Fellows of the College and their guests with a series of events of more than usual importance and interest. It is proper to express the hope that from time to time these valuable and instructive lectures may continue.

The scientific business of the College during the past year, therefore, has been excellent, not only in so far as the papers which the Fellows themselves have read, but also in so far as the Weir Mitchell Lectures are concerned. The College holds in high appreciation the work of the Committee in charge of our scientific business, and particularly of that of its energetic Chairman, Dr. H. A. Hare, as well as the work of the Weir Mitchell Lecture Committee and of its Chairman, Dr. Alfred Stengel, in these respects.

During the nine stated meetings and one special meeting of the College during the past year, 581 Fellows have been in attendance. The average attendance during the nine stated meetings was practically 62, being a decrease of 10 from that of the last year, a diminution due, as the Secretary points out, to the fact that the June meeting and an important session of the American Medical Association, at which many of our members were in attendance, were coincident. While it is interesting to make reference to the attendance of the Fellows at the meetings of the

College, such record does not in any sense, as has been many times pointed out, represent the actual attendance, inasmuch as many physicians not Fellows of the College frequently are our guests, and are much gratified at these opportunities of listening to the papers and the discussions which they elicit.

The work of the Publication Committee has been conducted with satisfaction, but as yet it has not been practicable to publish in these TRANSACTIONS lectures of special importance given in the College and of valuable papers read before the Sections of the College. Now, however, through the generosity of our late President, Dr. Arthur V. Meigs, as already announced this evening, a fund can be established, which, as the Treasurer has suggested, may be called the "Arthur V. Meigs Publication Fund," and if from time to time other generously minded friends and Fellows of the College shall add to it, this much desired addition to our TRANSACTIONS will become possible.

CONCERNING THE LIBRARY. Inasmuch as the Chairman of the Library Committee at the last meeting of the College had time to read only a brief résumé of his satisfactory report, it is proper to refer to some of its salient features. The total number of volumes in the Library at the present time is 97,803. Of unbound theses and dissertations we possess 10,123, and of unbound pamphlets 75,125. From all sources the Library has acquired during the past year 4817 volumes, 7845 pamphlets, and 32,194 numbers of various periodicals.

The literary activity of the Fellows of the College is again in evidence in that of the 724 new publications which were added to the Library during the past year, 41 were written or edited by Fellows of the College.

During 1911 there were 6157 visitors to the Library, and the records show that 2955 Fellows applied for books upon its shelves. As all members have access to the book stands and stacks, many more than this number of Fellows, whose applications are not on file, have used and enjoyed the privileges of the Library. Compared with last year, this is an increase of 1172 visitors and of 74 Fellows.

A comparison of the number of books which were consulted in the Library during 1911 with the number similarly consulted during 1912, shows an increase of 1143 consultations. So, too, there is an increase during the past year in the number of books taken out of the College Library—3758 in 1912 as against 3643 in 1911, or an increase of 115. At the present time we are receiving 1254 periodical publications, and the increase in subscriptions in this respect for the year is 132, that is, 23 American and 109 foreign. Of dissertations added to the Library during 1912 the number is 1206. Surely these figures (and many others might be added if time permitted) fully justify the Chairman's description of his year's report as one that "is extremely gratifying."

Last year it was necessary to state that there had been a decrease in the number of visitors to the Library during the year, practically in the same proportion as in the previous report, attributed by the Chairman of the Library Committee to the change of location, which he believed was still operative to a certain degree in this respect. Now, however, we can point to a notable increase of visitors (1172) as well as of Fellows (74), and the effect of the change of location is becoming, as it was prophesied it would, notably less active. The decrease in the number of unbound reports and transactions, as well as unbound pamphlets, recorded by the Librarian in the report of the Chairman of the Library Committee, is accounted for by the fact that more than 5000 of these have been bound into 370 volumes, and placed in their class upon the shelves.

The College is greatly indebted to Dr. Francis R. Packard for the locked steel bookcases with plate wire glass doors, finished in mahogany, which have been erected in the Packard Room to accommodate our collection of manuscripts. The Library Committee has placed similar bookcases in Study Room No. 1, wherein are housed the "Lewis curios," as well as other rare and valuable books, exclusive of incunabula, which belong to the Library. The suggestion that this room shall be appropriately furnished, and that authority shall be given to name it the Samuel Lewis Room, in memory of the late Dr. Samuel Lewis, should go

into effect. So, too, the suggestion that works of famous physicians illustrating the discoveries and advancement in the science of medicine from the inception of printing, each book to be properly ticketed with an explanatory note which records the reason that this author's writings are given a place in the collection, is an excellent one, and it is earnestly to be hoped that it may be carried out.

Last year I was unable to record any increase in the Library Endowment Funds. To-night I have the happiness to refer to three such funds, which have been received by the College during the past year, namely, the John Herr Musser Library Fund of $500, which had the donor lived would have been increased to $5000 or $10,000, the Douglas Stockton Warren Memorial Fund of $3000, the gift of Mrs. Henry M. Warren, and the J. Ewing Mears Fund of $2000, therefore in all $5500. In this place it is also proper to remind you that a Catalogue Endowment Fund has been established, and that the liberal gift of $1000 from Dr. John B. Roberts is the nucleus of this Fund, and that a donation of $1000 from our late President, Dr. Arthur V. Meigs, has been received as the foundation of a "Publication Fund."

Gifts to the College. The following is a list of rare medical books, works of special interest, paintings, engravings, and other valuable gifts received by the College during the past year:

Incunabula

(Total number of incunabula at this date, 170)

Barzizius, Christoforus. Introductorium ad opus practicum medicinae cum commentariis in ix Almansoriis. Papiae, Antonius de Carchano, 1494. [Hain no. 2666.] This edition is extremely rare. Only three copies mentioned by Pellechet. No copy either in the British Museum or in the Library of the Surgeon-General's Office. (Presented by Dr. George E. de Schweinitz.)

Burley, Walter. De vita et moribus philosophorum et poetarum. [Parisiis, Geo. Mittelhus, 1496.] [Copinger no. 1389.] (Fund for rare books.)

Culmacher, Philipp von Eger. Regimen wider die Pestilenz. [circa 1480.] [Hain no. 5848.] Not in the "Index-Catalogue" or in any bibliographical work which we have been able to consult; and, from inquiries we have made, it seems probable that it is the only copy in this country. (Presented by Dr. George E. de Schweinitz.)

Diogenes Cynicus. Epistolae. Diogenes epistolae interprete Francisco Aretino, Bruti et Hippocratis epistolae per Rainucium traductae. Florentiae, Antonium Francisci Venetum, 1487. [Hain-Copinger no. 6193] Very rare. (Fund for rare books.)

Dondus Paduanus, Jacobus. Aggregator Paduanus de medicinis simplicibus. [Argentorati, Rusch, circa 1470.] [Hain no. 6395.] Dr. Garrison, of the Library of the Surgeon-General's Office, says of this work, "the earliest known of medical incunabula." This is a perfect copy in excellent condition. (Presented by Dr. George E. de Schweinitz.)

Gerson, Johannes. De cognitione castitatis et pollutionibus diurnis, etc. [Coloniae, Ulrich Zell, circa 1470.] [Hain no. 7691.] (Presented by Dr. Richard H. Harte.)

Gerson, Johannes. De pollutione nocturna, an impediat celebrantem vel non. [Coloniae, Ulrich Zell, circa 1472–73.] [Hain no. 7695.] This is a rare edition in a wonderfully good state of preservation, from the first press at Cologne. (Presented by Dr. S. Weir Mitchell.)

Johannes Peachamus. Archbishop of Canterbury. Prospectiva communis. [Mediolani, Petrus Cornenus, circa 1480.] [Hain no. 9425]. Deals largely with the eye and optics. Very rare. (Fund for rare books.)

Paulus Venetus, Nicolettus. Expositio librorum naturalium Aristotelis Venetiis, Johannis de Colonia, 1476. [Hain no. 12515.] (Fund for rare books.)

Savonarola, Hieronymus. Ricetto contra morbo spirituale. [Florentiae, Bartholomaeus de Libris, 1497.] [Hain no. 14371.] Very rare. (Fund for rare books).

Works of Special Interest

Aldrovandus, Ulysses. De reliquis animalibus exanguibus libri quatuor. Bononiae, Bellagambam, 1606. De quadrupedibus solipedibus volumen integrum. Bononiae, Thebaldinum, 1639. Serpentium et draconum historiae, libri duo. Bononiae, Ferronii, 1640. Quadrupedum omnium bisulcorum historia. Bononiae, Ferronii, 1642. De quadrupedibus digitatis viviparis et oviparis. Bononiae, Tebaldinum, 1645. All the writings of Aldrovandus are considered rare, and these five volumes are exceptionally fine copies, in perfect condition, which greatly enhances their value. (Presented by Sir William Osler, M.D., Bart.)

Alexander Aphrodiseus et Michael Epheseus. Simplicii commentaria in tres libros Aristotelis de anima. Venetiis, Aldi Manutii, 1527. (Fund for rare books.)

Alghisi, Tommaso. Litotomia, ovvero del cavar la pietra. Firenze, Manni, 1707. (Presented in the name of Dr. Alfred Stillé.)

Bacci, Andrea. Del Tevere. Libri tre. Venetia, 1576. (Fund for rare books.)

Bauderon, Bricius. Paraphrase sur la pharmacopée. 2d ed. Lyon Servain, 1596. This is a rare edition of what, in its time, must have been a popular book. The Index-Catalogue does not contain this edition, and no mention is made of it in Brunet. There is a book-plate on the inside of the first fly-leaf which shows that this copy was once in the possession of the "Yemeniz Library"; and a leather label on the inside of the cover, that it was later in the Robert Hoe Library. This book was bound by Trautz-Bauzonnet. (Presented by Dr. George E. de Schweinitz.)

Beroaldus, Philippus. Opusculum de terraemotu et pestilentia. Bononiae, Benedictus, 1515. (Fund for rare books.)

Bibliotheca anatomica. 2 vols. Genevae, Chouët, 1685. (Presented by Mrs. Henry C. Chapman.)

Bottarelli, Giovanni. De bagni di San Casciano. Firenze, Vangelissi, [1688]. (Fund for rare books.)

Brown, William. To the medical officers of the general and flying hospitals in the army of the United States. Philadelphia, 1780. [Broadside.] (Presented by Dr. William Pepper.)

Browne, John. Compleat treatise of the muscles. [London], Newcombe, 1681. This is a fine copy of a rare work printed in English, and noted for its illustrations. (Presented by Dr. George E. de Schweinitz.)

Carnarius Gandensis, Joannes. De podagrae. Patavii, 1553. (Fund for rare books.)

de l'Epée, Charles Michel, l'abbé. Institution des sourds et muets. Paris, Nyon, 1776. (Fund for rare books.)

a Fonseca, Rodericus. De calculorum remediis. Romae, Ruffinelus, 1586. (Fund for rare books.

Galen, Claudius. Exhortatio ad bonas arteis. Basileae, Froben, 1526. (Presented in the name of Dr. Alfred Stillé.)

Galen, Claudius. Libri duo.*** Astrologia ad aphrodisium. De urinis. Venetiis, [Patavinus] 1535. (Fund for rare books.)

Garcia, Mathias. Disputationes medicinae selectae. Lugduni Bourgeat, 1677. This work must be quite rare. Not in Brunet, or in the other bibliographical works consulted. Not in the Index-Catalogue of the Surgeon-General's Office. (Presented by Dr. F. P. Henry, in the name of Dr. Herbert Norris.)

Glauber, Joh. Rudolph. De Elia artista. Amsterdam, Waesberge, 1668. (Fund for rare books.)

Glauber, Joh. Rudolph. De igne secreto philosophorum. Amsterdam, Jansson, 1669. (Fund for rare books.)

Glauber, Joh. Rudolph. Glauberus concentratus. Amsterdam, Waesberge, 1668. (Fund for rare books.)

de Gradi, Joannes Matthaeus Ferrarius. Practica. Venetiae, Scoti, 1520. (Fund for rare books.)

Harvey, William. Exercitationes de motu cordis et sanguinis. Edinburgi, Carfrae, 1824. (Presented by Dr. A. P. Brubaker.)

Hippocrates. Chymicus; seu, Chimicae Hyppocraticae. Coloniae, Vanden Dyck, 1690. Copies of this little book are very rare. Not mentioned by Poggendorf, Brunet, Graesse and other bibliographers. Prof. John Ferguson, in his Bibliotheca chimica, vol. 1, p. 118, states that he has never seen a copy. Not in the Library of the Surgeon-General's Office. (Fund for rare books.)

Lemnius [Ziriczaeus], Laevinus. Secret miracles of nature. London, Streater, 1658. (Presented by Dr. Bayard Kane.)

Redi, Francesco. Osservazioni intorno agli animali viventi. Firenze, Matini, 1684. (Presented by Sir William Osler, M.D., Bart.)

Sanctorius, Sanctorius. De statica medicina aphorismorum. Londini, Bowyer, 1716. (Presented by Dr. George W. Norris.)

Savonarola, Giovanni Michele. Libreto de tutte le cose che se manzano comunamente. Venetia, de Luere, 1508. (Fund for rare books.)

Sophia, Marsilius de Sancta. Tractatus celeberrimus de febribus. Lugduni, Trot, 1507. (Fund for rare books.)

Tagaultius, Johannes. De chirurgica institutione libri quinque. Lugduni, Rovillium, 1560. (Fund for rare books.)

Thornton, Robert John. Preuves de l'efficacité de la vaccine. Paris, Chomel, 1808. (Presented by Dr. George E. de Schweinitz.)

Valverde, Joan. De animi et corporis sanitate tuenda libellus. Venetiis, Lilius, 1553. (Fund for rare books.)

Victorius Faventinus [de Victoriis], Leonellus. Practica medicinalis. Venetiis, Constantinum, 1553. (Fund for rare books.)

Zacchias, Paulus. Quaestionum medico-legalium. Francofurti a. M., Bencard, 1688. (Presented by Mrs. Henry Chapman.)

Manuscripts

de Benneville, George. Medicina Pensylvania. [Philadelphia, circa 1770.] (German and English text.) (Presented by L. G. Myers, Esq.)

Coates, Samuel. Autograph letter to his kinsman, Joseph Paschall, September 25, 1793. Philadelphia, 1793. Written during the yellow

fever epidemic and interesting on account of its reference to Rush. (Presented by Dr. William Pepper.)

Massa de Argenta, Baptista. De fructibus vescendis. [Ferrariae, 1471.] The printed book is one of the earliest dated incunabula, and extremely rare. Maggs Brothers, of London, from whom the present book was obtained, make the following statement: "Probably the original manuscript from which the book was printed." (Presented by Dr. George E. de Schweinitz.)

Redman, John. Autograph letter to the Rev. Ashbell Green, Princeton, September 14, 1798. [Philadelphia], 1798. Written and signed by the first President of the College. (Presented by Dr. William Pepper.)

Shippen, William, Sr. Autograph letter to George Washington, December 10, 1783. Philadelphia, 1783. Written by Dr. William Shippen, Sr., father of the second President of the College. This is a letter of congratulation, written in the third person. Endorsed in Washington's handwriting. (Presented by Dr. William Pepper.)

Oil Paintings

Portrait of Dr. John Ashhurst, Jr., by Adolf Borie. (Presented by the children of Dr. Ashhurst.)

Portrait of Dr. George Friebis by W. C. Hafner. (Presented by the family of Dr. Friebis.)

Portrait of Dr. Isaac Hays by Ida Waugh. (Presented by his daughter, Henrietta M. Hays.)

Portrait of Dr. Wharton Sinkler by Alice Mumford Roberts. (Presented by the family of Dr. Sinkler.)

Statuary

Plaster bust of Dr. Richard A. Cleemann by Anna Jurgens. (Presented by the heirs of Dr. Cleemann.)

Marble bust of Galen. (Presented by Dr. Richard H. Harte.)

Other Interesting Accessions

Aesculapius. A very handsome print of E. J. Poynter's painting entitled: A Visit to Aesculapius. (Presented by Dr. S. Weir Mitchell.)

Musser, John Herr. Crayon sketch of Dr. Musser by John S. Sargent. (Bequeathed to the College by Dr. John H. Musser.)

Rabelais, François. Photograph of Rabelais' portrait in the Library of the University of Geneva. Dr. Charles G. Cumston, of Boston, from

whom it was purchased, says: "This is, I believe, the only authentic likeness of the great physician."

Reed, Walter. Large photograph of Dr. Reed. (Presented by Dr. A. C. Abbott.)

Royal College of Physicians of London. A colored print of a meeting of the Fellows of the College of Physicians (London). Published May 1, 1808. Rowlandson & Pugin, Delt & Sculpt. Bluck Aquat. Colored prints of this description are rare and quite difficult to obtain. (Presented by Dr. Richard H. Harte.)

Badge with bronze medal attached, worn by members of the Ninth International Otological Congress, August 12 to 17, 1912. (Presented by Dr. B. Alexander Randall.)

Massive oak desk. (Presented by Dr. J. Norman Henry.)

Shoe buckle worn by Benjamin Rush. (Presented by his great-granddaughter, Elizabeth Rush Porter.)

The growth of our collection of incunabula continues to be a matter of pride. Ten of these volumes have been acquired during the last year, so that now the total number of incunabula in our possession is 170. To our admirable Harvey collection I made reference in my last address, and expressed the hope that on some evening it would be possible to exhibit these works and to listen to a discourse concerning them. This hope was fulfilled in the Special Meeting of the College alreading described, when Dr. Mitchell delivered his charming address on "Some Newly Discovered Letters of William Harvey," and when the various editions of Harvey's works were appropriately displayed.

The oil paintings which we have received during the past year include a portrait of Dr. John Ashhurst, Jr., by Adolf Borie, presented by the children of Dr. Ashhurst; a portrait of Dr. George Friebis, by W. C. Hafner, presented by the family of Dr. Friebis; a portrait of Dr. Isaac Hays, by Ida Waugh, presented by his daughter, Miss Henrietta M. Hays; and a portrait of our late Vice-President, Dr. Wharton Sinkler, by Alice Mumford Roberts, presented by the family of Dr. Sinkler. A valuable acquisition to the art gallery is the crayon sketch of Dr. Musser by John S. Sargent, bequeathed to the College by our late much-loved Fellow. To the beautiful marble bust of Galen which graces

this Hall, presented by Dr. Richard H. Harte, I have referred, and the College is glad to have the bust of Dr. Richard A. Cleeman, who, to our deep regret, has so recently left us.

Concerning the Business of the College. As many of the Fellows present here this evening may not have heard the satisfactory report of the Treasurer, special reference may be made to one or two points connected with our financial standing. The total assets of the College on December 1, 1912, were as follows: Real estate valued at $561,091.16, invested funds, $191,937.13, being a total of $753,028.29. It will be remembered that the endowment of the Thomas Dent Mütter Fund for the Mütter Museum, about $30,000, and the Nathan Lewis Hatfield Prize Fund, about $7400, are not included in this list, as these funds are not in the hands of the Treasurer of the College. The *actual income* from all sources (excluding income of Trust Funds for special purposes), but including subscriptions, building fund, annual contributions, Hall Committee rentals, and Directory for Nurses for the year 1912 amounted to $28,392.45, while the expenditures during the year for all purposes amounted to $21,551.86, so that the *actually unexpended* balance to the credit of the College, other than trust funds, permanent fund, building fund, and subscriptions, on December 1, 1912, was $3171.34.

If a summary is made, with the inclusion under "receipts" of everything received by the Treasurer, that is, subscriptions, "trust funds" accepted by the College, and cash from the sale of securities for the "trust funds," and under "expenditures" of everything paid out by the Treasurer, including the income from the "trust funds" and cash paid for securities purchased for the "trust funds," the figures are as follows:

Transactions through the hands of the Treasurer of the College as per cash book, December 1, 1912:

Receipts (debit)	$61,679.17	
Expenditures (credit)	63,587.97	
Balance on hand		$21,205.76

In my last address I was able, with happy gratitude, to refer to the announcement of the Treasurer of the College that Mr. Eckley B. Coxe, Jr., had conveyed to the College the ground-rent of $40,000 held by him on the lot adjoining the College on the south, with the understanding that the College shall erect upon this ground a suitable memorial to our late Vice-President, Dr. Wharton Sinkler. At the January meeting the College by resolution accepted Mr. Coxe's most generous gift with the conditions named by him, and directed that a tablet setting forth the memorial, the inscription for which was approved at the April meeting, should be placed in the Hall. That this memorial may go forward is our earnest wish, and already, as the Fellows will remember, the College has appropriated a sum, not to exceed $6000, for carrying on this work, being a sum not sufficient to complete it, but as much as we can now afford. This memorial will not only make permanent record of the high appreciation in which the College holds the services of its late Vice-President, but it will fittingly indicate our gratitude for the generosity of Mr. Eckley B. Coxe, Jr., in this and many other respects. Therefore to increase these funds is a matter which should ever be in our minds in order that the necessary means for this purpose may be duly placed in the hands of those who have its accomplishment in charge.

The Finance Committee has appropriated the funds required by the various departments of the College, and has made these appropriations in as liberal a spirit as has been possible. It has not been necessary during the past year to entrust to the Building Committee any work of importance, except that this Committee took into consideration the erection of shutters as a protection against fire over the windows on the northern wall of the College. Partly on account of the expense which such an arrangement would have entailed, and partly because expert advice indicated that there was no real need of it, or rather that if these shutters were erected they would not afford the protection which would warrant the necessary expenditure of money, the plan was abandoned.

Because the Hall Committee believed that the second year of occupation of our building would create unusual expenses, it asked for an increased appropriation, which was granted. The College has heard with satisfaction that the work of the Committee during the past year has been so effectively and economically managed that it was unnecessary to spend the entire amount of this increased appropriation. It has sometimes seemed to me that we accept the comfort and beauty of our surroundings almost as a matter of course, not realizing how much in these matters we are indebted to the faithful and untiring work of this Committee. To the Superintendent, Mr. Charles Perry Fisher, and to the Clerk of the College, Miss Mary F. Zelner, I desire to convey the full appreciation of the College for the efficiency of their work.

The College has transacted all the routine business for the year, as well as all business brought to its attention from the Council, from the reports of special committees, and from resolutions presented on the floor of the College. The Committee appointed to select a design for a College gown continues its silence of the past year.

It is interesting to recall that the College has been consulted by the Director of Public Works of the City of Philadelphia in a request for the appointment of a Fellow to be a member of a commission to investigate the methods of the Bureau of Water. This appointment has been duly made, and the College is now represented on this Bureau of Water by Dr. Charles B. Penrose. The College has also been consulted by the General Secretary of the Society for Organizing Charity, with reference to the relocation of some of the municipal institutions now included in the City's plant at the Philadelphia General Hospital, and a communication drawn up by a specially appointed committee was sent to the proper municipal authorities.

Certain amendments to the ordinances and by-laws have been made, the important one being that the College has authorized through such an amendment recommended by the Council and duly adopted, the establishment of a Standing Committee on

Public Health and Preventive Medicine, and which in the coming year will go into active service. This has come about as the result of a special paper read by Dr. James M. Anders on "The College of Physicians and Public Health," to which paper I made reference in my last address. It seems to me that this committee is destined to be one of great importance, and in the future more than ever this Collegiate body will be consulted, as it should be, on matters pertaining to the public health.

Concerning Those Who Have Died. During the year just ended six Fellows have died:

Dr. Arthur V. Meigs, elected a Fellow in 1875, died on January 1, 1912. Always active in the affairs of the College, as Fellow, Councillor, Vice-President, and President, the sorrow over his death is not easily assuaged. A distinguished clinician, with a long record of fine service in the Pennsylvania Hospital, an industrious author and research worker, he maintained his opinions with impressive earnestness, opinions often at variance with those usually accepted, but always urged with the courage of deep conviction. His conscientiousness, his earnestness, his sterling honesty, his firm regard for the best traditions of this collegiate body, represented traits of character so enviable that all men might wish to have them.

Dr. George Friebis, elected a Fellow in 1893, died on January 26, 1912. A successful ophthalmic surgeon in public and private work, courteous and kind to colleague and patient, he ended too soon an honorable career, and is greatly missed by those who depended upon his ministrations.

Dr. John Herr Musser, elected a Fellow in 1882, died on April 3, 1912. His departure is too recent to speak of it without emotion. He was a great doctor, a distinguished teacher of clinical medicine, a consultant whose reputation was not bounded by the shores of this country, an earnest and active Fellow of this College, the splendid furnishing of this great Hall being ever-present reminders of his generous activities. He lived his life bravely, brave, too, in its last year in the face of the knowledge

that speedy death was certain. In his last pain-racked hour he thought, not of himself, but only of those for whom he had labored and whom he had cherished. His skilful ministrations to the sick and needy, his never-failing cheerfulness, his deep human sympathy made him the beloved man he was, and make him missed as few men are.

Dr. John W. Lodge, elected a Fellow in 1900, died on May 4, 1912. An able practitioner of medicine, he maintained his public duties as consultant to the Bryn Mawr Hospital. He walked the pathways of his useful life in quiet dignity, always kind and courteous, and ever ready with helpful service to him who needed it.

Dr. T. Hewson Bache, elected a Fellow in 1852, died on July 8, 1912. For sixty years a member of this collegiate body, he served as Librarian, as Curator of the Mütter Museum, and as a member of the Hall Committee. A great grandson of Benjamin Franklin, he doubtless inherited from him his accuracy of observation and precision of technique. Brave and distinguished during the days of the Civil War, his record of service has high place in the annals of that stirring period.

Dr. Richard A. Cleeman, elected a Fellow of the College in 1872, died on November 19, 1912. At the time of his death the senior Censor of the College, he had served at various times during the forty years of his membership as Secretary, Councillor, and representative on the Quarantine Board, and in all capacities had served well and faithfully, and with quiet and unobtrusive dignity. Actively engaged in a large and exacting practice, his kindness to the poor and needy has rarely been equaled. Of fine instincts, he was in all things which pertain to the best traditions of the practice of medicine an exemplar among the men of our guild.

Two Associate Fellows died during the year, Lord Lister on February 11, 1912, and Dr. Robert Fletcher, of Washington, on November 8, 1912. Thus the College has lost by death during the past year six Fellows. The resignation of one Fellow has been

accepted, eight Fellows forfeited their Fellowship, sixteen new Fellows have been elected; the net gain, therefore, is one.

On December 1, 1912 the roll of the College was as follows: Fellows, 456; Associate Fellows, American, 25, foreign, 19; Corresponding Members, 4; a total of 504.

Before closing this address it would seem proper that the present administration should make record in summary of some of the important events which have occurred in the history and efforts of the College during the past three years, namely:

1. The lease by the Free Library of Philadelphia of the property at Thirteenth and Locust Streets for five years, with an annual rental of $7000, and with the privilege on the part of the lessees of renewal on proper notice for another five years, year by year, with an increase of rental of $700 during each year of renewal.

2. The purchase by the College of the stable and the three small houses adjoining it on the south, made possible through the generosity of Mr. Coxe, in that he conveyed these premises to the College for a cash payment of between $5000 and $6000, that is, such an amount as reimbursed him over and above $40,000, reserving a ground-rent of $1600 a year, or 4 per cent. on $40,000.

3. The permission given by the College for the removal of certain small objectionable houses at the rear of our building, and subsequently the permission to raze to the ground the stable adjoining the College on the south at the expiration of the lease.

4. The neutralization of the decrease in the income of the College occasioned by the removal of the stable because, again by the great generosity of Mr. Eckley B. Coxe, Jr., the ground-rent on this property having been conveyed by him to the College, with the understanding that the suitable memorial to which reference has been made should be erected.

5. The accessions to our art gallery in the presentation of twelve portraits, a number of them of high artistic value, including a Sully, a Sargent, a Story, and a De Camp. The erection and placing of a number of marble statues, marble and bronze busts, among the most notable of which is the statue of Aesculapius, the bust of Galen, the bust of Aesculapius, the bronze bust of

Dr. Horatio C. Wood, and the marble busts of Dr. George B. Wood and Dr. S. Weir Mitchell. The completion of the tablets recording the names of benefactors and eminent benefactors, Presidents of the College of Physicians, and of the one in commemoration of the opening of this our present building.

6. The advantageous changes in the conduct of the Library, particularly improvement in the rapidity with which books are bound, the opening of the Library on two nights a week and on certain legal holidays, the steady increase in the completion of the catalogue, the improvement in the system of cataloguing, particularly in so far as reprints are concerned, and the facilities afforded by the private study rooms. During these three years the steady development of library material is evident from the fact that the total increase in the number of volumes has been 8684, of unbound pamphlets, 30,486, and of unbound dissertations, 4190, and of new publications, 2062. During this same period 19 incunabula and many rare and interesting books and important manuscripts have come into our possession. On January 1, 1910, the total Library Endowment Funds amounted to $72,140.28; today they amount to $85,056.60, or an increase of nearly $13,000.

7. The establishment of the Weir Mitchell Lectures and of the Public Lectures of the College, notable new features in our history and activities, and the noteworthy activity in the scientific business of the College, with the presentation of nearly one hundred papers, all of value, and some of them of great scientific merit.

8. The acquisition of a more exact and intimate knowledge on the part of the citizens of this municipality with the aims, functions, activities, and importance of the College brought about in large measure by means of the Public Lectures.

9. The renewed activity of the College in its relation to public health and public affairs—an activity destined to increase as the result of the establishment of a Committee on Public Health and Preventive Medicine.

10. The contributions to the College. During the last three years, that is, from January 1, 1910, to January 1, 1913, nearly

$146,000 have been added to our resources, sometimes in the gift of funds duly invested for definite purposes, for example, Library funds, endowment funds, and the like, and sometimes speedily dispensed in the discharge of immediate obligations, for example, in the furnishing of rooms, in the purchase of books, etc. It is to be understood that this money is entirely exclusive of any received from subscriptions or from the income of investments. On the first of January, 1910, the College owed $69,000, an amount increased to $74,000 very shortly by the necessity of placing a loan of $5000. Subsequently the College incurred an indebtedness of something over $40,000 by the purchase of the stable adjoining the College on the south in the manner already explained. These two indebtednesses were eliminated by the splendid generosity of Mr. Edward T. Stotesbury and Mr. Eckley B. Coxe, Jr., and to-day the College of Physicians does not owe one dollar, and has an actual unexpended balance to its credit of $3171.34. Independently of those who have been so liberal in their gifts, and whose names have been duly recorded with grateful thanks upon our minutes, and sometimes upon the tablets which face our walls, this fine showing in financial matters is due in largest measure to the efficient handling of our money affairs by the Treasurer of the College and its Finance Committee.

Because I have summarized this satisfactory condition of our finances not in any spirt of vainglory or boasting, but to put the Fellows in possession of knowledge which they should have, it does not mean that we should sit still in idle contentment. On the contrary, we should be spurred on to ever-increasing activities; for just as the College grows in grace, effort, and importance, so, too, grows it in need. One of the first of the needs is a reduction of the dues, raised in the hour of our necessity, but soon, I hope, to be restored to their former amount, or at least to be materially reduced.

In my last address I urged that some change in the presentation of matters pertaining to the general routine business of the College should take place, in order that more time would be at the disposal of the Fellows for deliberations on scientific subjects.

This matter is now under consideration by a Committee of Council, and soon a report will be ready for consideration by the College.

Upon the walls of our Hall place should be found upon which should be inscribed the names of those Fellows who have served their country in time of war, from the days of 1776 to those of 1898. This "Roll of Honor," as suggested by Dr. S. Weir Mitchell, would be a striking addition to those tablets which now exist, and a worthy tribute to those whose names would compose it.

Before closing this address, as well as my present official connection with the College, I desire to make expression of my high appreciation of the honor that has been mine during the past three years in that I have been privileged to preside over the meetings of this distinguished Collegiate Body, and to thank you for your cordial support and constant courtesy.

A LOBAR FORM OF BRONCHOPNEUMONIA OF LONG DURATION, OCCURRING IN CHILDREN AND YOUNG ADULTS[1]

By DAVID RIESMAN, M.D.

For some time, possibly four or five years, I have been interested in a disease of the lungs which cannot be readily classified nor easily named.

Case I.—The first case I saw was in a young girl, who came to the dispensary of the Polyclinic Hospital and puzzled my colleagues and myself by a long-continued, low fever. Week after week on her visits to the clinic we noted a moderate elevation of temperature, and as she had a cough, was pale and of poor physique, tuberculosis was naturally suspected. But aside from failure to find any bacilli in the sputum, the physical signs—an abundance of crackling rales—were strictly limited to one lower lobe, there being no involvement of the apices. The history did not suggest an unresolving lobar pneumonia, and the child, so far as I can recall—the record is now lost—was not confined to bed at any time. After a most protracted course, covering possibly two or three months, the girl recovered completely.

Case II.—On September 12, 1911, I saw in my office Pearl L., a girl, aged thirteen years, who had been coughing for two weeks. At the age of two years she had whooping cough, otherwise she had been well. Although she did not appear to be very ill, I found impairment of resonance over the entire left lower lobe and sharply limited to it. The breath sounds were harsh and of a bronchovesicular character. There were also numerous crackling rales. The right side as well as the upper lobe of the left lung was entirely normal. Temperature, 99.5°; pulse, 120. Four days later the signs were more marked, the involvement extending from the base of the left lobe to a little above the middle of the left scapula,

[1] Read February 5, 1913.

and from the spinal column to the postaxillary line. The impairment was, however, very slight, and only discoverable by careful comparison of the two sides. The rales were of a coarse, moist type; temperature, 98.9°; pulse, 108. On her next two visits very few rales could be detected. On October 27, six weeks after I first saw her and eight weeks after the beginning of her illness, rather coarse rales confined entirely to the left lower lobe could still be heard. On November 22, no rales could be found, but as late as January 4, 1912, four months or more after the onset of the disease, the breath sounds over the left base were still a little harsh. I saw the girl again February 17, 1912, for some trifling condition, and at that time the lungs were clear.

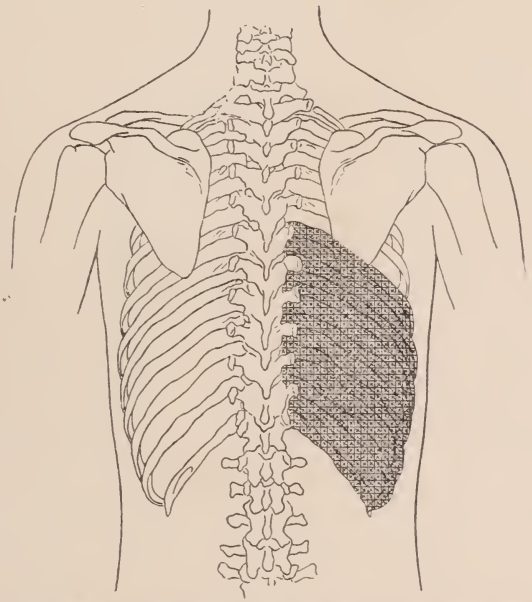

FIG. 1.—Bertha M. Impairment of resonance; bronchovesicular breathing; crackling rales; right lower lobe.

CASE III.—Bertha M., aged nineteen years, a Normal School girl, came to see me March 31, 1911, on account of a severe cough from which she had suffered on and off for three months. She is very robust and comes of healthy stock. The cough has "somewhat run her down," to use her own words. Temperature, 100.5°; pulse, 120. On examination I found impairment of resonance over the right chest from the angle of the scapula to the base. Over this area the vocal fremitus was a little increased. On auscultation over the entire lower right lobe posteriorly, laterally,

and in front from the mammary region down, numerous crackling rales could be heard. The lung elsewhere was normal. (Fig. 1.) The patient had no expectoration, the appetite was diminished, the bowels constipated. By April 8, only a few dry rales remained at the base of the right chest.

Case IV.—Bernice B., aged six years, had whooping cough soon after birth, a mastoid operation and adenectomy at three, otherwise nothing except slight anemia and transient choreiform movements. I saw her first on May 28, 1912. She had been coughing for some time. On June 6, I noted in my records: Cough very hard; temperature, 99.4°; harsh breathing at left base. On June 10: Cough continues; temperature, 99.4°; slight impairment of the percussion note of the left lower lobe posteriorly and in the axillary region, with harsh breathing and a fair number of fine rales. On June 17, the notes state: Temperature normal; cough less severe; rales have nearly all disappeared.

Case V.—Dora Y., aged thirteen years, was seen with Dr. Hofkin on June 27, 1912, the history being that she had been ill with a continued fever for some time; just how long I could not ascertain. Typhoid fever and tuberculosis had been suspected. There was no cough; no expectoration; the fever was moderate; at no time had the child seemed very ill. A few weeks before she was taken sick an uncle had died in the same house of lobar pneumonia. Examination of the patient, who was up and about, showed slight impairment of resonance over the entire lower right lobe posteriorly and in the axillary region. The vocal fremitus was not altered. On auscultation a tremendous shower of crackling rales, which became a little finer after coughing, could be heard. Inspiration was harsh and expiration somewhat prolonged, but not bronchial. I ventured the positive statement that the child did not have tuberculosis and would recover fully. In September Dr. Hofkin wrote to me that the girl had been taken to Atlantic City and that he had found the lungs clear five weeks after our consultation, but had noted the persistence of harsh breathing over the formerly affected lobe. When he reëxamined her in September not the slightest abnormality could be detected.

Case VI.—Sarah R., a girl aged twelve years, was first seen October 20, 1912. For three or four weeks she had had a severe cough, with some expectoration. According to the mother the child had been subject to such attacks for several winters, and when once started they would last throughout the cold season. The cough was worse at night and often disturbed the child's sleep. There were no night-sweats. The family history was good, and as for the patient, aside from the winter cough, she had had nothing except chickenpox at the age of two years. Examination showed over the left lung posteriorly a slight impairment of resonance. On auscultation numerous dry and some moist rales could be heard over

the lower lobe of the left lung, behind and as far forward as the midaxillary region. (Fig. 2.) Nowhere else were any abnormal sounds to be detected. The heart was normal; the spleen not enlarged; temperature, 98°; pulse, 80. A few days later the patient had a severe stitch in the left side with a catch in breathing. When I saw her on October 27, there was no friction sound. The resonance over the left lower lobe was still a trifle impaired; the rales had disappeared.

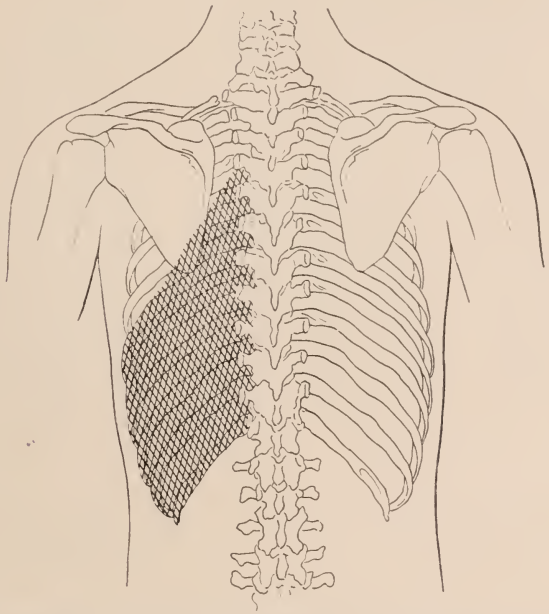

Fig. 2.—Sarah R. Impairment of resonance; bronchovesicular breathing; crackling rales; left lower lobe. Posterior view.

Case VII.—W. N., a colored lad, aged fourteen years, was sent to me by Dr. Watson, at the Polyclinic Hospital, on March 1 of this year, because, just as he was about to undergo an operation for enlarged tonsils, it was discovered that he had a temperature of 100°. The boy had had diphtheria at the age of seven and frequent attacks of tonsillitis. He did not complain of anything, but after we had detected the physical signs about to be described he admitted that for a week past he had had a slight cough, without expectoration, and some headache. I wish I could picture to you the surprise of my group of postgraduate students—and my own—when upon examination we found over the lower lobe of the left lung many small moist rales, bronchovesicular breathing, and impairment of the

percussion note. (Fig. 3.) There was nothing in the history, in the symptoms, or in the general impression that the boy made upon us to suggest any trouble in the lung. Had it not been for our practice of making a routine examination of the posterior bases of the lung the trouble would surely have been overlooked. It is not improbable that some of the

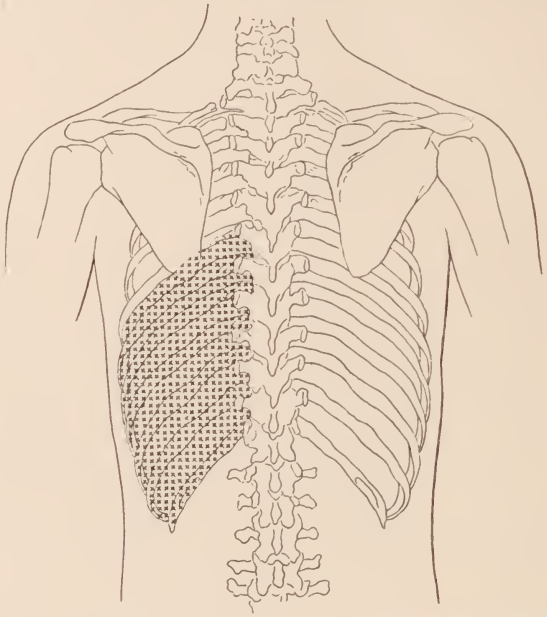

Fig. 3.—W. N. Impairment of resonance; bronchovesicular breathing; crackling rales; left lower lobe.

ether pneumonias are preceded by just such a condition as we found in this boy. If that is true then it behooves us in every case before an operation to make a thorough examination of the back of the chest.

The blood count gave the following results:

Hemoglobin	88 per cent.
Red cells	5,320,000
Leukocytes	16,160
Differential count:	
Polymorphonuclear cells	57.4 per cent.
Mononuclear cells	7.0 "
Small lymphocytes	28.6 "
Transitional	5.4 "
Eosinophiles	1.6 "

At the end of three weeks from the time he was first seen the boy was entirely well.

I have cited the foregoing seven cases as typical of the disease. I have seen perhaps double that number.

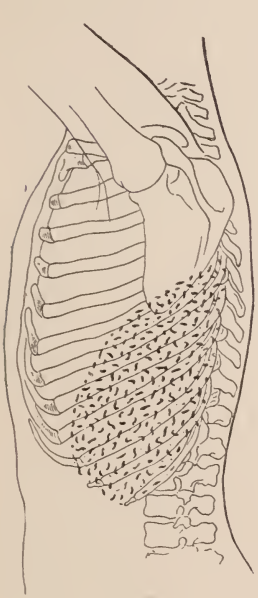

FIG. 4.—Dr. H. Impairment of resonance; bronchovesicular breathing; crackling rales; left lower lobe. Lateral view.

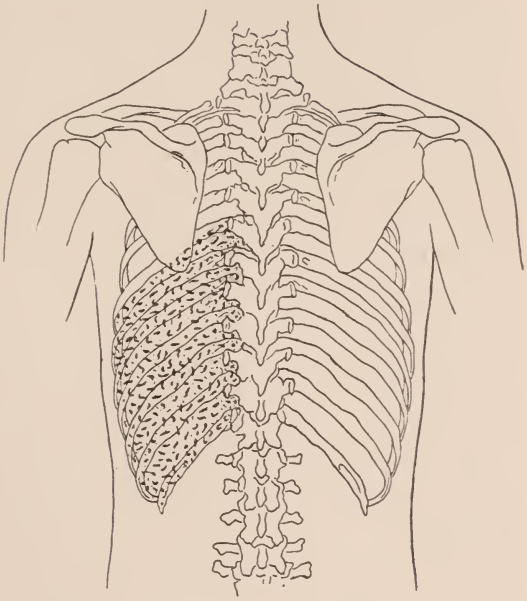

FIG. 5.—Same as Fig. 4. Posterior view.

PATHOLOGY. There have been no autopsies and no *x*-ray examinations, so that the actual pathological anatomy is an inference. The condition is not an ordinary bronchitis: (1) because it is strictly unilateral, while bronchitis is generally bilateral; and (2) because unlike bronchitis it is accompanied by an impairment of the percussion note and by breathing of a bronchovesicular character. Repeated examination in my cases has shown the physical signs to be quite stationary in the part first affected. Nor can the condition be a pleurisy: the signs remain unchanged, no fluid is demonstrable, the tactile fremitus is either not altered or increased, and the line of dulness follows the slant of the

division between the lobes and has not the characteristic curve of an effusion. There is also practically no pain.

It is not a lobar pneumonia of the ordinary type, for it has not the acute, sharp onset, nor does it at any time give the impression that there is complete consolidation of the lung.

The view that we are dealing with a lobular or catarrhal pneumonia becoming confluent and assuming a lobar distribution seems to me to accord best with the conditions present. While lobular pneumonia in the vast majority of cases is a bilateral process, there is no inherent reason why it may not be unilateral. As the modes of infection in the two forms of pneumonia are not unlike; and as the infecting organsim is generally the same, it is well within the law of probability that lobular pneumonia may be confined to the same parts of the lung as lobar pneumonia. Since we possess no satisfactory explanation for the lobar distribution in the one none can be demanded for a similar distribution in the other.

In some experiments with the pneumococcus, Dr. Kolmer and myself, using the Lamar-Meltzer method, produced in dogs a pneumonia confined to a single lobe that to our minds had the characteristics of a spreading lobular rather than of a true lobar pneumonia, thus bearing a close analogy to the disease under discussion. At best, however, the pathological differences between lobular pneumonia and lobar pneumonia are neither great nor important.

It has not been possible to obtain sputum in many of the cases. When it was obtained it showed chiefly pneumococci. That the pneumococcus is capable of causing not only acute but also chronic pulmonary infections is demonstrated by the painstaking researches of Leutscher.

There is no evidence that the condition is an interstitial pneumonia of the type so ably described by Dr. Jacobi,[1] for it heals without residue—without evidence of retraction.

The disease would not impress anyone as a manifestation of influenza. The cases I have seen were scattered over a consider-

[1] Arch. Ped., January, 1903.

able period of time. They had none of the catarrhal symptoms nor the prostration so characteristic of influenza. Moreover, no other members of the patients' families were affected.

The chief symptoms are cough and a moderate fever, rarely above 101°, extending over a long period—from several weeks to three or four months. The cough may be harassing, but at times is slight, scarcely of enough moment to attract attention. There may be considerable expectoration or none; it may contain a little blood, but in my experience has never been rust-colored. The physical signs are entirely out of proportion to the symptoms. There is always some dulness, which is most easily detected by a careful comparison of the two sides, and usually extends to the angle or the middle of the scapula. Rales are, as a rule, abundant, and of the peculiar quality best described as consonating. They are moist rather than dry, though both types may be found. In the presence of minor subjective symptoms the listener will often be surprised when approaching the base of the chest to find his ear bombarded by a chorus of exquisitely crackling sounds. The rales are heard best in inspiration, and are often increased by coughing. In the majority of cases the disease involves the lower lobe of the left lung, but this may be a mere coincidence, as the number of cases is as yet too small for a definite conclusion. Girls predominated among my patients. As to age, the majority were between ten and twenty years—one was twenty-seven and one twenty-eight years. All the cases have ended in recovery without a vestige of the morbid process remaining.

On looking, not exhaustively, through the literature I find nothing directly bearing upon the subject. A number of authors in their chapters on bronchopneumonia state that at times the disease is most marked in one lobe, and when confluent may simulate lobar pneumonia. Such types are, however, described as exceptionally severe, with high fever, marked dyspnea, profound prostration, and great danger to life. They differ thus radically from the disease with which we are dealing. Beddard[1] speaks of

[1] Allbutt and Rolleston's System of Medicine, London, 1909, vol. v.

a primary lobular pneumonia which is usually confluent and is diagnosticated as lobar. This, however, has a sudden onset, with high temperature and severe nervous symptoms; the duration is short, the pyrexia is quite regular and sustained, and it often ends by crisis. This, of course, does not correspond to our disease. West[1] described three types of bronchopneumonia, none of which is identical with the one under consideration; although he recognized a secondary bronchopneumonia, not, however, of lobar type, with a protracted course lasting three months or more. The nearest approach is found in Powell and Hartley's book.[2] They speak of a confluent form involving adjacent lobules of a large portion of the lung, sometimes a whole lobe, producing more or less dense consolidation. It may be associated with ordinary bronchitis of catarrhal origin, and very often occurs in the course of whooping-cough. They have also met with it in certain cases of heart disease, and as a complication in pulmonary tuberculosis. In none of my cases was whooping-cough, heart disease, or pulmonary tuberculosis a factor in the process; moreover, in severity and course the condition described by Powell and Hartley and the one here discussed are very different. Babcock[3] recognizes a confluent bronchopneumonia, but does not go into details regarding the symptoms of course. Wilson Fox does not mention it.

Treatment. In the treatment the measures that have seemed to me of some avail are counter-irritation to the chest, abundant feeding, and either a simple cough mixture with a small dose of an opiate, or one of the creosote preparations. Whenever the weather was favorable I advised that the patient be taken outdoors. A sojourn at the seashore in proper season is also beneficial.

The essential features of the condition I have described may be epitomized as follows:

1. The disease is a confluent lobular pneumonia of lobar distribution characterized by long duration, low fever, and the follow-

[1] Diseases of the Organs of Respiration.
[2] Diseases of the Lungs, 1911, fifth edition.
[3] Ibid., New York, 1907.

ing physical signs: impairment of resonance, bronchovesicular breathing, and showers of crackling rales.

2. It must be looked upon as one of the causes of obscure long-continued fever.

3. The disease always seems to end in complete recovery both symptomatically and anatomically.

4. In the beginning typhoid fever may be suspected, in the later stages tuberculosis.

5. The disease is, I believe, often overlooked, due to the fact that the lower posterior parts of the chest are seldom examined in ambulatory cases, especially when the symptoms are rather trivial. I am quite sure the diagnosis of tuberculosis is often made in these cases of chronic cough, with low, continued fever; but if the chest is carefully examined, back and front, above and below, the peculiar, almost specific character of the disease will be discovered, and then the thought of tuberculosis will be no longer entertained.

DISCUSSION

Dr. Charles M. Montgomery: I am very glad that Dr. Riesman has brought this matter before us. It is a subject in which everybody is interested and at the same time one which we do not hear very much about. I recall particularly one case of considerable duration presenting diminished breath sounds and rales at one base and fever, the other symptoms being insignificant. Last summer at the Pennsylvania Hospital in the out-patient department in the service of Dr. Krumbhaar, among 562 medical patients only three could in any way be compared to those of Dr. Riesman. These showed localized pulmonary signs. These three cases revealed rales limited to one or other of the bases posteriorly. One was a child of eight months, one of eight years, and one a man of forty-two years. Unfortunately these cases did not report frequently enough to absolutely identify them with the type of which Dr. Riesman has been speaking. The classification of these cases with localized signs in one part of the lungs is interesting. The diagnosis of such conditions as far as physical signs are concernes depends upon finding some slight abnormalities present over a limited portion of the

chest. As Dr. Riesman has said we cannot believe that we are dealing with a simple bronchitis because the process is localized. That point was emphasized by Austin Flint half a century ago. He insisted that a circumscribed bronchitis pointed to an involvement of the pulmonary tissue itself. Only one other thing is apt to be confused with it, that is, a localized pleurisy. I think insufficient attention is paid to these slight signs mentioned and that therefore the condition is often classified as bronchitis and the pulmonary inflammation not recognized. Further light on the origin of cases of the type described by Dr. Riesman must be acquired through bacteriological examinations. The *x*-ray may be of assistance in some cases, in most it will probably not add much new information.

Dr. Riesman: We made no cultures but have made some sputum examinations. Staphylococci and pneumoccoci were found in the sputum.

THYMUS DEATH IN THE NEWBORN, WITH REPORT OF A CASE[1]

By EDWARD P. DAVIS, M.D.

The mother, Mrs. F. C., aged thirty years, applied for medical care to the Wharton Street Maternity Dispensary of the Jefferson Hospital, stating that she was in a pregnant condition, near term, and having vaginal hemorrhage. The Dispensary Staff found that her statement was true and that she had been suffering from irregular bleeding for several days.

On examination, she was in fairly good condition, beginning to show the effects of bleeding, the child living and in fair condition, and a low attachment of the placenta, with partial separation, was evidently present. She was brought by ambulance to the Jefferson Maternity, and delivered as soon as possible by Cesarean section.

The membranes were unruptured. On opening the uterus it was observed that the child moved violently in the membranes, and during the brief time occupied in delivery several respiratory movements were made. The child was a female, weighing $6\frac{1}{2}$ pounds, of average development, and fairly nourished.

The mother's convalescence was uninterrupted.

Especial attention was given to the infant, as it was thought that possibly it had inspired amniotic liquid at the moment of birth. It cried naturally and did well for twenty-four hours, but died in spasm, with dyspnea. During the life of the infant its neck and thoracic region presented nothing abnormal, although

[1] Read February 5, 1913.

in the newborn the upper portion of the thymus can sometimes be felt, if the child be thin and ill-nourished. Autopsy showed a greatly enlarged thymus, which had caused death by compressing the trachea.

The anatomical study of the thymus shows a mass of lymphatic tissue without connection with the respiratory mucous membrane or with the thyroid gland. It is derived from the ectoderm of the third gill cleft of the embryo. Its blood supply is very free, derived from the subclavians, carotids, internal mammaries, and thyroid arteries. It grows rapidly during the seventh, eighth, and the ninth months of intrauterine life, and for some time after birth. Its function is unknown.

Tumors in the region of the neck may occasion dystocia and require embryotomy for the termination of labor. These cases indicate that the thymus may be abnormal before labor, but throw no light upon the part which it plays in sudden death after birth.

Sudden death in the newborn may arise from causes other than conditions of the thymus.

Haberda[9] draws attention to sudden death in infancy in diseases of the lungs and intestine.

Neumann[14] draws attention to the necessity for caution in ascribing sudden death in infancy to conditions of the thymus without anatomical proof of its occurrence.

Hammar[6] believes many cases of alleged thymus death should be referred to some condition of the heart. The part which the thymus plays in these cases is the formation of a toxin which acts poisonously upon the circulation.

Hart[7] takes essentially the same ground.

Cases of compression of vessels and nerves by the enlarged thymus have frequently been reported, some of them complicated by syphilis.

Warthin[19] reported cases of partial stenosis of the larynx occurring as the result of enlargement of the thymus in the newborn.

In discussion of this paper, Holt, Blake, and others confirmed

the observation, and Jacobi drew attention to the fact that stridor might occur in bronchial pneumonia.

Moscoso[13] has observed stridor following enlarged thymus.

The congenital aspect of thymus death is illustrated by Griffith's[5] paper, where 7 deaths occurred in one family in children, aged from one to eight months. Bronchitis was present in some, and autopsy revealed enlarged thymus.

Sabatier,[18] while admitting a connection between sudden death in the newborn and hypertrophy of the thymus, draws attention to the fact that the essential factor in these cases is an altered state of the blood, and that one will find in the meninges, suprarenals, and other regions of the body where circulation is free, or blood is formed, evidences of the essential lesion. That enlargement of the thymus may be accompanied by stenosis of the trachea, not relieved by resection of the thymus, is shown by Weill, who reports the case of a child in convulsions which persisted after the thymus had been resected, and which at autopsy was found to depend upon stenosis of the trachea.

Planchu[15] and Rendu, in the case of an infant dying after two attacks of dyspnea, found miliary abscesses in the hypertrophied thymus.

Doubt in cast by Carlyll,[3] who has collected 61 cases of thymus death, and believes that the relation between this occurrence, and so-called status lymphaticus, has not been clearly established.

Without multiplying references as to the causation of thymus death, we may draw attention to the fact that the embryology and histology of the gland suggest that it is intimately concerned with the blood-making and metabolic processes of the fetus. Recent studies in relationships existing between the placenta and the thyroid gland indicate that the large thymus in the newborn must share in various disturbed conditions of maternal and fetal metabolism. In abnormal states it is reasonable to suppose that it adds a toxin to those formed in the placenta and in the ductless glands of the fetal body.

A possible reason for its sudden enlargement after birth may be found in the measures sometimes taken to establish respiration

in the newborn. The most simple and universally employed method consists in folding and unfolding the body of the child in such a manner as to encourage the circulation of blood through the lungs and thorax. A delicate lymphatic organ, like the thymus, composed of lymph follicles, and with a very rich blood supply, might easily become surcharged with blood during this manipulation, and its sudden engorgement through mechanical pressure might bring about death.

These suggestions are based (1) upon analogy between altered conditions of other ductless glands of the fetal body and sudden death, and (2) on reported results of treatment addressed to the relief of mechanical pressure. Thus, d'Oelsnitz,[4] Prat, and Boisseau report a case of impending death with thymus hypertrophy temporarily relieved by resection of the thymus, accompanied by partial resection of the manubrium sterni. The child died from infection and the remaining portion of the thymus was found sclerotic and adherent to the trachea.

Weill's[20] case, already quoted, where partial resection of the thymus was unsuccessful and death followed from stenosis of the trachea, shows that operation may be followed by inflammation and adhesion of the remaining portion of the gland to the trachea. Abscess in the enlarged thymus, to which reference has already been made, suggests evacuation of pus by incision.

When one remembers that the enlarged thymus has been found deep in the chest surrounding the carotid artery, the possibility of a considerable resection in the newborn becomes remote. Thus, Penkert[16] reports two cases in which the thymus measured from 7 to 6.5 cm. in one dimension, and 1.5 to 2 cm. in another. Other cases report what must have been much larger glands, but without accurate measurements.

In the case reported it is possible that the mother's hemorrhage had altered the condition of the fetal blood, and in consequence produced alteration in the size and condition of the thymus. That the gland was enlarged before delivery is shown from the fact that the fetus was observed to make inspiratory movements of an unusual character before the membranes were opened.

Evidently the disturbance of eventrating the uterus and compressing the lower segment to control hemorrhage was sufficient to influence the fetus.

It is difficult in the present state of our knowledge to suggest measurements for preventing thymus death. Attention to the mother's hygiene during pregnancy is certainly demanded. Delivery by Cesarean section exposed the child to the least possible mechanical disturbance, so that birth pressure can be excluded in this case and no prolonged or vigorous efforts were made to establish respiration.

A further study of the thymus from the standpoint of toxins and sera may throw light on this obscure condition.

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DISCUSSION

Dr. J. P. Crozer Griffith: Dr Davis has referred to the paper which I wrote on this subject some years ago. This paper was instigated by reading a text-book article which assumed that the matter was already settled, that all thymus deaths were due to pressure, and that there was no such thing as status lymphaticus, and the symptoms attributed to it. Certainly this was an opinion entirely out of accord with that held by the large majority of pediatrists, and one which demanded proof rather than assertion. I was glad to hear the speakers tonight admit the lack of positive knowledge by the profession regarding the strange condition under discussion.

The term "thymus death" is rather an unfortunate one, because it does not have always the same meaning. There is undoubtedly proven to exist a death by pressure of the thymus gland upon the trachea. I collected in my paper from the literature about twenty cases which by the symptomatology and post-mortem findings gave evidence of pressure upon the trachea and in which death might be preseumed to have occurred by strangulation. There were ten cases in which operation had been done with more or less relief, showing that the thymus gland could produce pressure symptoms. Other cases of both conditions have been reported since then. All thirty showed evidence through life of slowly oncoming death. The majority of so-called thymus deaths have been *sudden* deaths. I believe with others that such deaths are cardiac deaths. It is not the thymus which produces the death; the enlargement is but one of the anatomical expressions of the underlying condition. There are many theories of how death is produced in cases where the thymus is enlarged. It is difficult to prove or disprove any of them. There is no anatomical proof of the occurrence of sudden congestion. However well supplied with blood vessels the gland may be before or at the time of birth, later it is not a very vascular organ, and it is difficult to conceive of a sudden dangerous enlargement from this cause. Moreover, Clessin attempted to produce congestion experimentally in dogs,

but without success. Again, the experiments of Simon and d'Oelsnitz of placing an enlarged thymus in position in the cadaver, injecting melted paraffin into the trachea, and then bending the head backward, did not produce any indentation of the trachea. This indicates that the oft-quoted theory of Beneke and others is not correct, viz., that the enlarged thymus rises into the critical space of Grawitz, when the head is thrown back, and thus strangles the child. Time is lacking to review the other theories which have been advanced. That most generally accepted for these cases of suden death is that the condition is a neurosis, toxic, perhaps, in origin, and that for some unknown cause, varying with the case, there is a sudden arrest of the heart's action.

MYOCARDIAL HYDROTHORAX, WITH REPORTS OF CASES[1]

By JAMES M. ANDERS, M.D., LL.D.

A collection of transuded serum in the pleural cavities is a secondary condition, most commonly associated with either cardiac or renal dropsy or the severe anemias, *e. g.*, leukemia and progressive pernicious anemia. Not infrequently, hydrothorax also supervenes in chronic dysentery, chronic diarrhea, carcinoma, syphilis and scurvy. In all of the chronic diseases mentioned, the condition is in most cases, at least, a late development, often in the course of general dropsy, but such familiar examples are not included in the present discussion. It is also my purpose to exclude from consideration in this paper, hydrothorax dependent upon local stasis due to new growths of the pleura, lungs and diaphragm.

The renal group is a large one and while the cases of hydrothorax that are secondary to chronic parenchymatous nephritis are not considered here, those that come on in the course of chronic interstitial nephritis, are unilateral, as a rule, for longer or shorter periods of time, and are caused by foregoing dilatation of the heart, are included with the purely myocardial form. In the latter class, both heart and kidney conditions are due to one and the same cause, namely, arteriosclerosis. It is readily conceded that in valvular heart affections attended with general venous engorgement, the process may be unilateral for a time in consequence of local obstruction, but this group of cases is also

[1] Read February 5, 1913.

eliminated from full consideration here, although reference will be made hereafter to its relative frequency as compared with mycardial hydrothorax. In short, this paper deals solely with instances of hydrothorax due to myocardial disease, but with some of which chronic interstitial or atrophic nephritis was associated.

The opinion commonly prevails among writers that in cachectic and renal cases, hydrothorax is usually bilateral. But though transudation is, in the majority of cases, bilateral, certain American authors, *e. g.*, Stengel, Osler and Pepper, have insisted upon the view that it is sometimes unilateral throughout the whole or greater part of its course, *e. g.*, in the cardiac group of cases, which may be occasioned either by myocardial changes or chronic valvulitis, and when so, is usually right-sided and may be unaccompanied by external dropsy.

Causes of Myocardial Hydrothorax. The association of cardiac disease and unilateral hydrothorax is not rare. This view is confirmed by the observations of Lord,[1] who found in a series of 15 cases that 6 were unilateral and right-sided, of which 5 were complicated with heart lesions. It is a point of major significance that in myocardial disease the same mechanical influences are at work to bring about a pleural transudate as in valvular disease, principally cardiac dilatation, and more particularly of the right auricle. Moreover, the foregoing fact enables us to understand the reason for the election of the right side of the thorax as the seat of the serous transudate, in cases in which the condition originates primarily in sclerosis of the blood vessels. Toxic poisoning of the myocardium or of the nerve centres, is most probably also a causative factor of first-rate importance in the production of myocardial hydrothorax.

Again, cases of apparently incipient arteriosclerosis, so far as the peripheral bloodvessels are concerned, may show more marked changes in the small arteries that supply the viscera, the heart and kidneys inclusive. This has been revealed by recent pathologic studies and in such instances both the cardiac insuffi-

[1] Osler's Modern Medicine, iv, 848.

ciency on which the hydrothorax depends, and also the urinary phenomena when present, are produced by a more or less hidden arteriosclerosis.

On reviewing the literature bearing upon the immediate causes of the cardiac variety of pleural transudate, one finds that several recent theories have been advanced and ably championed. A considerable number of writers, among them Cardanelli, Villani, Howe, Lizzatto and Pepper, attributed the occurrence of right-sided transudation of serum to an old pleural inflammation of low grade, which has so altered the perivascular tissue "that subsequently serous extravasation occurred with general venous stasis that had not become sufficient to cause external or bilateral pleural edema." Stengel[1] cites Villani and Peter, as suggesting that irritations or inflammations of the liver may extend through the diaphragm to the pleura, and thus occasion a combined pleural exudate and transudate.

German writers have also called professional attention to this variety of the condition in many forms of liver and heart disease, including chronic myocarditis. These may show marked latency so far as general symptoms are concerned, to be followed after a variable length of time by edema of legs, hepatic enlargement, and finally, a left-sided transudate.

More recently, competent observers have noted the occurrence not uncommonly of unilateral or right-sided hydrothorax independently of hepatic disease. Jaccoud first suggested pressure upon the azygos vein and superior vena cava as the cause. Stengel, who arrived at the same conclusion, independently, argues from anatomical considerations, *i. e.*, the relationship of the chest vessels to adjacent structures, that "even a moderate dilatation of the right auricle and cavæ must of necessity exercise considerable compression upon the azygos vein and thus reduce its lumen." Of course, similar conditions do not obtain on the left side of the chest.

More recently still, Fetterolf and Landis[2] have, as the result of

[1] University of Pennsylvania Medical Bulletin, June, 1901.
[2] American Journal of the Medical Sciences, November, 1909.

their investigations, concluded that the serous fluid comes from the visceral and not from either the parietal pleura or azygos veins, the outpouring being caused, "so far as the pressure factor is concerned, by dilated portions of the heart pressing on, and partly occluding the pulmonary veins." They continue: "Greater frequency on the right side is due to the fact that dilatation of the right auricle is more common and more easy than a similar condition of the left side, and such dilatation is the only factor needed to cause damming back in the right pulmonary veins. On the left side, in order to include both upper and lower veins, there is needed dilatation of the left auricular appendix and of the left ventricle, with possibly a retrodisplacement of the vertical septum mentioned above, three factors as against one on the right side." In 13 out of my 16 cases of the myocardial form, the hydrothorax was wholly on the right side throughout.

Incidence of Myocardial Hydrothorax. Of 27 cases of hydrothorax due to heart lesions that have fallen under my observation, and of which I have clinical notes, not less than 16, or 59 per cent., were apparently caused by myocardial disease. In 5 of the 16 cases, clear and convincing indications of well-pronounced chronic interstitial nephritis were co-existent. These were doubtless instances primarily of arteriosclerosis to which both the myocardial changes and the nephritis were secondary.

In 8 cases only slight evidences of arteriosclerosis co-existed, so that the probabilities are that either the myocardial degenerative and inflammatory lesions were primary, or the changes in the bloodvessels of the heart and other viscera were decidedly more marked than in those that are accessible. In 9 cases, however, or 56 per cent., the cardiac incompetency, which led to the production of the hydrothorax, was caused by chronic myocarditis as will appear evident hereafter.

In none of the 16 cases were the clinical evidences of foregoing valvular sclerosis found. Of course, these figures are too small to base thereon safe inferences, and it is well-known that individual experiences differ to a marked degree in relation to special conditions, yet there can be no room to doubt that hydrothorax,

due to chronic myocarditis, is more common than has been supposed. In this connection, it is interesting to note that all of my cases occurred in males.

Diagnosis of Myocardial Hydrothorax. Cases of myocardial hydrothorax are often characterized by extreme latency, particularly during the earlier portion of their course, the only subjective symptoms complained of being dyspnea especially on unwonted effort, and a dry, unproductive cough, which is not especially annoying. This was true of most instances observed by me, although in all the signs and symptoms of chronic myocarditis, *e. g.*, cardiac dilatation with hypertrophy, commonly hypertension, arrhythmia, dyspnea, and in 5 cases, as before stated, those of chronic interstitial nephritis, were present.

Obviously, a careful physical examination of the entire thorax would serve to enlighten the clinician, but is, according to my personal experience, often neglected because the hydrothorax which gives rise in a measure, at least, to the dyspnea and cough, is unsuspected. Moreover, my observation confirms the view that a serous collection of considerable magnitude in the right pleural sac may go unrecognized in the hands of a physician, who is not fairly expert in the matter of physical examination. The physical signs are the same as those of pleurisy with effusion, but unlike the latter, serous collections are never encapsulated.

Osler[1] points out that postmortem records show how frequently the condition is overlooked. This fact is applicable in an especial degree to the cases that arise in the course of chronic myocardial changes after secondary dilatation supervenes, without external edema, and independently of valvular sclerosis. For example, in 3 of the 5 cases of hydrothorax, which had not been recognized, no external edema co-existed until late in the course of the condition.

The principal error in diagnosis then, it has seemed to me, is in the assumption that hydrothorax is not to be expected in cases of cardiac disease, in which the signs of chronic valvulitis and external edema are absent. Obviously, not all cases of

[1] Text-book of Medicine, p. 668.

arteriosclerosis with hypertension in which dyspnea whether on exertion or otherwise, is present, are due to hydrothorax, since this is a striking feature of chronic myocarditis, as a rule, but if on close examination, hydrothorax is found to be absent in this condition (chronic myocarditis), it should be recollected that, as pointed out by Janeway,[1] it indicates marked danger of cardiac insufficiency.

Of the 16 instances of myocardial hydrothorax that have fallen under the writer's observation, not less than 5 had been unrecognized, the severe dyspnea having been attributed mainly, at least, to so-called cardiac or cardiorenal asthma and pulmonary congestion. The symptoms and physical signs, however, give a characteristic picture, although it is sometimes difficult to differentiate the cause, chronic myocarditis, from other underlying diseased states in which hydrothorax supervenes.

It is not uncommon to meet with cases of myocardial insufficiency that simulate closely those of valvular disease, particularly mitral incompetency with which may be associated evidence of a mild grade of stenosis. There is, however, not obtainable a clear history of acute articular rheumatism in chronic myocarditis, but commonly of one of the exciting factors that may precipitate secondary dilatation of the heart, such as physical or mental overstrain, an intercurrent febrile affection and the like. Moreover, the apical murmur has a more limited area of transmission in non-valvular cases, and if the heart be "whipped up" by the use of cardiac stimulants, it loses in intensity and may even disappear.

It is said that, as a rule, transudation is not excessive, but in 2 of my cases, as much as 2000 c.c. of serum were removed on several occasions, and in 1 case, not less than 6500 c.c. were with drawn at a single operation. In 15 out of the 16 cases of myocardial hydrothorax, tappings were carried out and no instances of mixed transudate and exudate were met with, although in 1 case of a right-sided transudate, a left-sided pleuritis with effusion was associated. While at first sight, it may

[1] Journal of the American Medical Association, December 14, 1912.

seem trite to suggest that more or less suspicions cases should be needled, there can be little doubt that this simple procedure, which gives us reliable information as to the existence and nature of the process, is not resorted to as regularly as it deserves to be.

Course and Prognosis. While death is inevitable in by far the majority of cases, soon or late, even after marked improvement or apparent comfort has been brought about as the result of treatment, hydrothorax may develop, as my clinical records show, at a comparatively early stage of arterial or myocardial disease without recurrence of the condition, if appropriately treated, and life prolonged indefinitely. Thus one of my cases has shown persistent good health for fifteen years following repeated aspirations, and the use of cardiac tonics and stimulants as well as other measures; another for a period of twenty months, and still others for shorter intervals of time.

Treatment. The treatment of this form of hydrothorax must have the same objects in view as in the other varieties, and has reference to the removal of the transudate by tapping the chest, and so far as possible of the causative condition by hygienic and medicinal means. It is futile, as a rule, to attempt to get rid of the transudate by the exhibition of digitalis and other cardiac stimulants without first withdrawing the fluid by aspiration, if it be considerable in amount. I have repeatedly observed that this class of drugs only tends to aggravate the dyspnea without either diminishing the amount of the transudate or increasing, to an appreciable extent, the urinary secretion.

On the other hand, after removing the fluid by means of thoracentesis, carditis stimulants often take hold and are of signal service in overcoming the dilatation of the heart and preventing a recurrence of the transudate. The myocardial insufficiency in these cases demands a resort to remedies that will strengthen the heart muscle, *e. g.*, digitalis, strophanthus and the like, independently of an increased blood pressure, although nitroglycerin should be combined with these drugs if the arterial tension be decidedly elevated.

Rest is a most valuable adjunct in the treatment of the cardiac

dilatation to which the hydrothorax is due; it must be, however, absolute and long continued. The use of saline laxatives carried to the point of rather active catharsis, *e. g.*, three or four fluid evacuations daily, proved of decided service in a few of the cases. In 5 instances of the series herewith reported, a salt-poor diet was employed with favorable effect, reaccumulation of the transudate being thereby noticeably delayed.

Brief notes of my series of cases are here appended:

Case I.—Col. M. M. J., aged sixty-two years; occupation, Quartermaster, U. S. A.; height, 5 feet 10 inches; weight, 160 pounds; first consulted me March 25, 1898. Family history negative. Had childish diseases, and later in life some indications of gout. Habits temperate, except that he was fond of the pleasures of the table. No syphilitic infection. The present illness began about one year ago with symptoms of neurasthenia and indigestion. He later developed dyspnea and fatigue on effort for which he was sent to Atlantic City, but here his condition did not improve, and he was referred to me by his physician.

At my first examination, I found the patient suffering from marked dyspnea, a moderate increase of blood pressure with accentuation of second aortic sound, a dilated heart and the physical signs of right-sided hydrothorax, the sac being about one-half filled. The urine contained an occasional trace of albumin and a very few narrow hyaline casts; specific gravity 1010 to 1015. Aspiration followed by complete rest for a period of two months and the use of cardiac stimulants and a non-nitrogenous diet caused the dyspnea and other symptoms to disappear. At the end of six months he again enjoyed good health, which persisted until one year ago, when he died of an acute illness.

Case II.—Mr. F. L. M., married; aged fifty-seven years; occupation, general shipping agent. Family history: Father and one paternal uncle deceased of paralysis, otherwise negative. The patient has the usual infections of childhood; was subject to tonsillitis during adolescence; occasional mild attacks of rheumatism. Six years ago was told by a physician that he had "kidney trouble;" was ill for one month. Habits: Moderate use of coffee; excessive use of tobacco; no indulgence in alcoholics.

The present illness began six weeks ago when the patient noticed that he was losing weight and strength, and that he was becoming short of breath, and had palpitation at times. When I first saw the patient on March 17, 1908, there was evidence of marked arteriosclerosis, heart hypertrophied, second aortic sound much accentuated and a moderate

amount of free fluid in the left pleural sac, none in the right, and some edema of feet and ankles. Examination of the urine gave the following result: Specific gravity, 1010; albumin, small ring; casts, a few hyaline and finely granular; daily amount, 25 ounces. Blood pressure, systolic, 232, diastolic, 198 mm. Hg. On May 23, the left chest was aspirated and 17 ounces of fluid, having a specific gravity of 1014, were removed. The dyspnea was much improved. The patient left the hospital three days later, and no subsequent report on his condition has been received.

Case III.—Mr. H. L. J., married; aged forty-eight years; occupation fireman, formerly miner. Family history: Two brothers, nephew and niece deceased of tuberculosis, otherwise negative. During the first decade the patient had pertussis, scarlatina and measles, the latter complicated by otitis media. Habits: Excessive use of coffee and alcohol for many years; has also smoked moderately.

The patient first became indisposed on August 27, 1908, when he noticed some shortness of breath while walking to work. This dyspnea increased rapidly and four days later, he was forced to quit his occupation. When admitted to the Medico-Chirurgical Hospital, on October 17, 1908, the patient complained severely of dyspnea upon the least exertion pain in left chest aggravated by breathing and by coughing; muco-purulent expectoration and occasional attacks of vomiting. The patient was cyanosed and an examination revealed an enormously hypertrophied and dilated heart with weak rapid pulse; no free fluid in the chest, though numerous fine moist rales were audible over the bases of the lungs. There was marked edema of the feet and ankles. Examination of the urine showed the presence of a heavy ring of albumin, a few hyaline and finely granular casts and a specific gravity of 1030. Systolic blood pressure, 180; diastolic, 165 mm. Hg. Examination of the sputum failed to reveal any tubercle bacilli, but showed numerouus staphylococci and streptococci. On October 26 an accumulation of free fluid was noted in both pleural sacs, dyspnea increasing, while pain in left chest had ceased. Three days later, the left chest was aspirated, and 21 ounces of cloudy serum, having the characteristics of an exudate were removed. Cultural studies revealed the presence of streptococcus pyogenes. The following day, the right chest was punctured, and 20 ounces of fluid, having a specific gravity of 1014, were withdrawn. This transudate contained 2.5 per cent. of albumin, and was free from infecting bacteria. Following this operation, the hydrothorax showed no tendency to reaccumulate. On the other hand, the left-sided pleurisy persisted and the exudate was removed on two other occasions, before the death of the patient, which occurred on November 9, 1908.

A summary of the autopsy findings is as follows: Heart hypertrophied and much dilated, especially right auricle; pericardium contained 4

ounces of serous fluid; no fluid in right pleural sac, which was normal in appearance; right lung edematous; left lung collapsed by pressure of large amount of purulent exudate; extensive recent pleural adhesions on left side; kidney showed congestion and diffuse nephritis.

Case IV.—Mr. A. E., aged forty-six years; weight, 210 pounds; height, 6 feet; occupation, police officer. Family history: Father died of heart and kidney disease; one sister of pulmonary tuberculosis. The patient had the ordinary childish diseases, including scarlatina; typhoid fever at twelve years, and since then, occasional attacks of influenza. Patient has used excessive amounts of spirituous liquors for the past eight years, consuming from 15 to 20 "whiskies" daily during this time; has also carried the habit of chewing tobacco to excess for many years.

The present illness began in November 1908, with shortness of breath, aggravated by exertion; this gradually increased until the patient was unable to lie down, and there was marked edema of the legs. Under treatment, the patient improved somewhat for a time, but soon after returning to his occupation there was a recurrence of the previous symptoms. About July 1, 1909, he came to the out-patient department of the Medico-Chirurgical Hospital, where he was treated at intervals until admission to the hospital on January 6, 1910. At thie time, there was edema of the legs extending half-way to the knees; some cyanosis and marked dyspnea. Heart markedly hypertrophied; second aortic sound accentuated; no murmur. At that time there was no fluid in the chest. Liver much enlarged; slight ascites. A faint trace of albumin, but no casts, were found in the urine; specific gravity, 1031. Blood pressure, systolic, 214; diastolic, 194 mm. Hg. During the stay of twelve weeks, patient showed much improvement, which continued until July 1911, when, following undue exertion, he had a recurrence of the foregoing symptoms. Again admitted on October 16, 1911, with signs of cardiac dilatation and right-sided hydrothorax. Following removal of this fluid, patient experienced much relief. Since then he has been aspirated at intervals of two months, during which time about 20 ounces accumulate.

Case V.—Mr. B. H. W., married; aged sixty-six years; weight, 186 pounds; height, 5 feet $8\frac{1}{2}$ inches; occupation, manufacturer: Family history negative. The patient has been well with the exception of the ordinary childish infections and an occasional attack of gout. Habits good, except for the immoderate use of alcoholic beverages during the past thirty years.

On November 30, 1908, the patient came to me complaining of vertigo, dyspnea on exertion and dimness of vision. Physical examination revealed cardiac hypertrophy and marked arteriosclerosis. Systolic blood pressure, 225; diastolic, 203 mm. Hg. Ophthalmic examination showed iritis and a retinal hemorrhage near macula. Urinalysis resulted

as follows: Albumin, small ring; indican, moderate reaction; casts, several narrow hyaline and finely granular; specific gravity, 1022. His condition remained about the same until September 5, 1909, when he was taken acutely ill with symptoms of cardiac failure and renal insufficiency. Ten days later, free fluid was discovered in the right chest, and a moderate amount of transuded serum was removed by aspiration. This procedure resulted in much relief as to dyspnea, but the patient gradually sank into uremic coma and died three days later. No autopsy was permitted.

Case VI.—Mr. V. A. C., aged sixty-one years; weight, 175 pounds; height, 5 feet 9 inches; occupation, railroad inspector. Family history negative. Had usual diseases of childhood; sciatica twenty-nine years ago, and a severe attack of influenza ten years ago. Excessive use of coffee and tobacco, but no alcohol. Six years ago (December, 1906), I treated the patient in the Medico-Chirurgical Hospital for lobar pneumonia, which was followed by circumscribed, right-sided empyema, from which the patient made a complete recovery after the removal of the exudate, and remained well until January 1910, when he became ill while sojourning in Florida. He complained of marked dyspnea, unproductive cough and prostration. Upon his readmission to the hospital (March 5, 1910) I found the heart much dilated, blood pressure moderately elevated, Cheyne-Stokes breathing, cyanosis without dropsy and signs of free fluid in the right pleural sac. Examination of the urine revealed a trace of albumin and a small number of narrow hyaline and finely granular casts; specific gravity, 1028. On March 15, 48 ounces of fluid, having a specific gravity of 1014, were removed from the right chest; on March 19, 46 ounces, and five days later, 32 ounces were withdrawn. The patient experienced much relief following each operation, but on March 27, he developed facial erysipelas and died four days later.

Case VII.—Mr. P. R., aged forty-two years; weight, 167 pounds; height, 5 feet 6 inches; Italian; occupation, tailor. Family history negative, excepting death of sister of heart disease. At age of twelve years, patient has severe attacks of epistaxis at intervals for one year. Moderate use of wines and tobacco; gonorrhea fifteen years ago.

The present illness began about July 1, 1910, with pain and swelling in right leg, which, however, did not incapacitate him for work until August 15, when the pain became acute, and he was forced to go to bed. At this time, he began to complain of difficulty in breathing, at times amounting to orthopnea, associated with cough and frothy expectoration. When admitted to the Medico-Chirurgical Hospital, October 6, 1910, dyspnea was marked, moderate arteriosclerosis present and the right lower extremity swollen and tender, otherwise no edema. The heart

showed signs of myocardial changes (dilatation), and there was a moderate amount of free fluid in right pleural sac. This transudate (18 ounces in amount) was withdrawn, but in spite of rest and vigorous cardiac stimulation, the patient died suddenly three days later. Autopsy was not permitted.

Case VIII.—Mr. P. L., married; aged sixty-five years; weight, 165 pounds; height, 5 feet $6\frac{1}{2}$ inches; occupation, dealer in live stock. Family history: Father deceased of some bronchial disease, mother of dementia; otherwise negative. Besides the usual infections of childhood, the patient had acute articular rheumatism at twenty-eight years; malaria at thirty years; erysipelas at fifty-two years and gouty neuritis at fifty-eight years of age. He used coffee and smoking tobacco moderately.

The present illness began about October 19, 1910, when the patient first noticed dyspnea and palpitation on exertion. These symptoms, however, were not sufficiently marked to confine him to bed until March 16, 1911, when they had become more urgent. At this time, the heart was considerably dilated, second aortic sound slightly accentuated; no murmur; pulse irregular; lower extremities edematous. Examination of the urine revealed a small ring of albumin, a moderate number of narrow hyaline and finely granular casts, and a specific gravity of 1025. Following rest in bed and cardiac stimulation, the patient improved somewhat for a time, but early in June, 1911, the symptoms again became aggravated and a moderate right-sided hydrothorax was discovered. This slowly increased and on June 15, one quart of clear fluid, having a specific gravity of 1010, was removed. Marked temporary belief followed this operation, but the fluid rapidly reaccumulated, and aspiration was again performed on June 22. Salt-free diet was now ordered, and rapid diminution in the general edema followed, but the transudate in the chest reaccumulated, though more slowly. On July 3, 23 ounces were removed from the right chest, and from this time until the date of his death, August 1, 1911, the chest remained free from fluid.

Case IX.—Mr. H. W., admitted to the Medico-Chirurgical Hospital June 15, 1911, aged fifty-two years; weight, 225 pounds; height, 5 feet 9 inches; occupation, farmer. Family history: Mother deceased of heart disease, maternal grandmother and aunt of carcinoma. Had always been well with exception of usual diseases of childhood. Habits: rather excessive use of chewing tobacco and alcohol since early manhood; uncomplicated gonorrhea eighteen years ago.

The present illness began suddenly six weeks ago, when he awakened one morning in a profuse perspiration and had to gasp for breath. Under treatment by his physician, Dr. J. D. Niles, he improved and felt comparatively well until one week since when he was again seized with marked dyspnea and vertigo, which persisted. Four days ago, he first

noticed swelling of feet and legs. On admission, I found the patient dyspneic, cyanosed, the heart moderately dilated, physical signs of right-sided pleural effusion, and a small amount of free fluid in the abdomen. Examination of the urine gave negative results, except for low specific gravity (1010), while an examination of the blood pressure showed systolic 155, diastolic 130 mm. Hg. The right chest was aspirated immediately, and 10 ounces of serum with specific gravity of 1010, were removed. With rest in bed and the use of cardiac stimulants the patient continued to improve and left the hospital twelve days later apparently well. The patient so continued until late in July, when he had a recurrence, and returned to the hospital, where it was found that the transudate had reaccumulated. Following aspiration, the patient experienced much relief, and left the hospital ten days later in good condition, and has since shown no indications of a recurrence of hydrothorax.

Case X.—Mr. H. C., married; aged fifty-three years; weight, 168 pounds; height, 5 feet 5 inches; occupation, liveryman. Family history: Father and brother deceased of dropsy. The patient had been well with exception of measles during childhood. He ate hurriedly and at irregular hours; consumed about five or six cups of coffee and one bottle of beer daily. Gonorrhea eight years ago.

The present illness began June 14, 1911, when, following unusual exercise, he noticed weakness and shortness of breath. As it was impossible to induce the patient to take sufficient rest at home, his physician sent him to the Medico-Chirurgical Hospital on July 3. On admission, physical examination revealed a dilated heart, an apical murmur with small area of transmission, marked arrhythmia, many cardiac impulses, failing to reach the radial arteries. Liver somewhat enlarged. The urine showed a small ring of albumin and numerous hyaline casts; specific gravity, 1025. Systolic blood pressure, 106; diastolic, 92 mm. Hg.

On July 11, there was some edema of ankles. Two days later, signs of free fluid appeared in right chest. As this slowly increased in amount, it was removed two days later, 25 ounces being obtained. The dyspnea was at once largely relieved, and the patient became quite comfortable. Following this, there was gradual improvement in his condition, with disappearance of the murmur, and the fluid showed no tendency to reaccumulate. However, on July 29, the patient sat up in bed and suddenly fell over dead. Permission for an autopsy was not obtained.

Case XI.—Mr. M. D. J., married; aged fifty-six years; weight, 138 pounds; height, 5 feet $7\frac{1}{2}$ inches. Family history: Rheumatism on maternal side; father deceased of nephrolithiasis. Patient had the usual childish infections, including diphtheria at six years of age; patient suffered from a heat stroke when 19 years old, following which high temperatures have always caused discomfort; severe attack of influenza and rheu-

matism thirteen years ago; subject to digestive disturbances for many years. Habits good; temperate use of smoking tobacco.

In February, 1910, the patient began to have attacks of angina pectoris. At that time the heart was hypertrophied; second aortic sound accentuated; arteries markedly sclerotic; systolic blood pressure, 185 mm. Hg. Under treatment, the angina attacks became less frequent and gradually ceased, and the patient enjoyed fairly good health until May 29, 1911, when he began to complain of dyspnea. This soon became troublesome, and was associated with cough.

Physical examination on June 22, 1911, showed cardiac dilatation, arteriosclerosis, a moderate right-sided hydrothorax and edema of the legs. Examination of the urine revealed specific gravity, 1010; albumin, a small ring; casts, a moderate number of narrow and medium hyaline, finely and coarsely granular; otherwise negative. As the result of prolonged rest in bed, salt-poor diet, purgation and cardiac stimulation, the fluid gradually disappeared with marked improvement in his general condition. Since July, 1911, there has been no return of the hydrothorax and the patient has remained free from symptoms.

Case XII.—Mr. B. E., aged fifty-one years; occupation, travelling salesman (referred by Dr. L. W. Moyer); height, 5 feet 8 inches; weight, 186 pounds. The family history showed the death of mother of Bright's disease, and that of the father of heart disease; the usual diseases of childhood, including scarlatina; nine years ago had ureteral calculus (left-sided) removed. Patient used alcoholic stimulants in moderate quantities, but tobacco freely, having smoked eight to ten cigars daily for twenty years.

The present illness began October, 1910, with dyspnea, dry cough, but no edema; as result of treatment, improved and felt, comparatively speaking, well until three weeks ago when he climbed five flights of stairs, after which the above symptoms recurred in an aggravated form. On November 7, 1911, when I first saw him, there was much distress of breathing on exertion, heart dilated and hypertrophied, some edema at bases of lungs and signs of right-sided pleural effusion without fever or general dropsy; systolic pressure, 172 mm. Hg.; the arteries were palpable, pulse compressible with difficulty. Small albuminuria and the presence of narrow, hyaline and granular casts. Patient admitted to Medico-Chirurgical Hospital, where he remained five months at complete rest, with the use of a salt-poor diet, saline laxatives and cardiac stimulants, chiefly small doses of digitalis, combined with nitroglycerin. Heart stimulants, however, aggravated dyspnea until transudate had been removed from right sac. Later developed edema of legs. After six tappings, fluid failed to recur and external edema disappeared. Patient left hospital on April 6, 1912, in fairly good general condition. On July 1,

received statement from his home physician reporting a sudden recurrence of cardiac dilatation after too much exertion, proving rapidly fatal.

Case XIII.—Dr. T. F. L., married; aged seventy-four years; weight, 134 pounds; height, 5 feet 8½ inches; occupation, physician. The family history was negative, except for death of mother of tuberculosis. Beside the usual childish diseases, the patient had acute articular rheumatism at age of thirty-nine. Tea and coffee moderately; excessive use of chewing tobacco.

The present illness began two years ago, when the patient first noticed arrythmia, which gradually became worse and was associated with dyspnea on exertion. When first seen by me, December 24, 1911, there was orthopnea, legs slightly edematous, vessels decidedly sclerotic, heart-action irregular, heart dilated, a faint apical systolic murmur, and marked right-sided hydrothorax, which had been overlooked by the two attending physicians. Urinalysis showed a faint trace of albumin, occasional hyaline casts and specific gravity at 1015. Systolic blood pressure, 118; diastolic, 108 mm. Hg.

Between this date and March 26, 1912, when the patient entered the Medico-Chirurgical Hospital, the right chest was aspirated six times, each time with much temporary relief. During this period, the patient was given a non-nitrogenous, salt-poor diet, purgatives and cardiac stimulants. After the last tapping, the fluid showed no tendency to recur, and the murmur had disappeared; the patient gradually improved and felt comparatively well until the last of June, 1912, when he had an apoplectic stroke which proved fatal.

Case XIV.—Mr. S. J., single, aged twenty-one years; weight, 135 pounds; height, 5 feet 8 inches; occupation, laborer on railroad. Family history negative. The patient had the usual childhood infections, pneumonia at four years of age; annual attacks of tonsillitis, five years ago, was squeezed between two railroad cars, sustaining some internal abdominal injuries. Habits good.

Two years after the above-mentioned trauma was received, dyspnea and abdominal distention appeared. These symptoms gradually became worse until February, 1912, when the abdomen was tapped and 20 quarts (patient's statement) of ascitic fluid removed. During the next three months, paracentesis abdominis was performed three times.

When admitted to the Medico-Chirurgical Hospital on June 22, 1912, there was urgent dyspnea; cyanosis; large amount of free fluid in right chest; heart dilated; pulse markedly irregular; no murmur audible, although first sound quite impure; superficial veins distended; excessive ascites; liver enlarged; slight edema of lower extremities. The urine was normal excepting the presence of a few hyaline casts. Blood pressure,

systolic, 115; diastolic, 100 mm. Hg. On June 24, 10 quarts of transudate were removed from abdomen. The right chest was aspirated with the following results: On July 6, 8 pints; July 16, 13 pints, 10 ounces; July 30, 12 pints. The fluid from the abdomen was also withdrawn at frequent intervals. Following each operation, the patient was much relieved, but both the pleural and ascitic fluids showed a tendency to reaccumulate rapidly. Shortly before leaving the institution, a small amount of fluid was discovered in the left pleural sac; this, however, was insufficient to necessitate aspiration. The patient left the hospital on August 7, 1912, and died three months later.

Case XV.—Mr. J. L. J., married; aged sixty-four years; weight, 144 pounds; height, 5 feet 8 inches; occupation, merchant. Family history negative. The patient had the ordinary childhood infections. About eight years ago, had some pulmonary trouble; since then has been spending winters in Florida. Habits have been good, although until recent years, he worked hard under nervous tension.

The present illness first manifested itself about two years ago when slight dyspnea on exertion was noticed. This increased very gradually and did not cause the patient much inconvenience until early in July, 1912, when the dyspnea became constant, and at times amounted to orthopnea. When I first saw the patient on July 12, 1912, his breathing was very labored and signs of moderate arteriosclerosis with slight cardiac dilatation were present. At the apex was heard a faint systolic whiff, which was transmitted but a short distance. Signs of bilateral hydrothorax of considerable extent were elicited, although this condition had been overlooked by two prominent physicians. At this time, only slight edema of the ankles was visible, but later this became marked and extended to the hips. Urinalysis revealed a small ring of albumin, a moderate number of narrow hyaline and finely granular casts and a specific gravity of 1022; amount eliminated in twenty-four hours being 20 ounces. Systolic blood pressure, 162; diastolic, 140 mm. Hg.

The next day the patient was aspirated and 2 quarts of fluid were removed from each pleural sac. Reaccumulation, however, occurred, and three weeks later, the operation was repeated with a similar result. On August 13, and again on August 21, fluid was withdrawn from each side of the chest. Following the last operation, absolute rest in bed was enjoined (owing to extreme nervousness and dyspnea, this measure had not previously been practicable) and a salt-poor diet, cardiac stimulants and laxatives were ordered. Under this treatment, there was marked improvement; the edema of the legs rapidly disappeared and the chest remained practically free from fluid, cardiac compensation becoming reëstablished. After a rest in bed for two weeks, the patient was permitted a limited amount of exercise; his favorable condition persisted

until early in November, when as a result of undue physical exertion, there was a recurrence of the previous symptoms with evidence of uremic intoxication superadded. Following the withdrawal of the pleural transudate and the institution of other active therapeutic measures, improvement gradually ensued. The patient's present condition is quite encouraging, although aspiration of the chest becomes necessary at intervals of about three weeks.

Case XVI.—Mr. W. G., aged fifty-nine years; weight, 190 pounds; height, 5 feet 8 inches; occupation, shipper in brewery. Family history: Father deceased of heart disease; mother of kidney disease. Patient does not recall any previous illness. Intemperate use of coffee, tobacco and alcohol. No venereal infections.

The present illness began about ten years ago, since which time patient has complained at intervals of dyspnea, palpitation and headaches. When admitted to the Medico-Chirurgical Hospital on August 13, 1912, he showed a tendency to stupor, was very dyspneic and cyanosed, heart dilated with relative mitral systolic murmur, second aortic sound accentuated. Signs of free fluid in right pleural sac. The systolic blood pressure 185 mm. Hg. The urine contained a medium ring of albumin and a moderate number of hyaline casts; specific gravity, 1008. Examination of the eye-grounds by Dr. J. A. Brophy revealed advanced albuminuric retinitis and recent hemorrhages in both eyes. Removal of the fluid was followed by relief of dyspnea, but patient gradually became comatose, and died four days later. No autopsy was performed.

DISCUSSION

Dr. Judson Daland: It is important that our attention should be drawn to the occurrence of latent bilateral hydrothorax in myocardial inflammation and degeneration as the symptomatology is readily explained by the condition of the myocardium, the liquid in the pleura is overlooked because no physical examination is made. The presence of this effusion in one pleural sac, frequently the right, depends upon a number of known and unknown factors. Preëxisting disease of the pleura and azygos vein by pressure are the two more important causes. In my experience certain of these cases have not done well under the influence of digitalis, more especially if we have reason to believe there is degeneration of the myocardium. Strophanthus is more uniformly beneficial than digitalis, provided the preparation employed is active. The tincture as ordinarily obtained is inert. It therefore behooves us to be exceed-

ingly careful in securing a tincture of strophanthus known to be efficient. In hypertension with myocardial inflammation or degeneration it has seemed to me in general that my experience with nitroglycerin has been against the idea so prevalent that nitroglycerine is of benefit. I have been unable to demonstrate to my own satisfaction that the hypertension in myocardical inflammation or degeneration has been permanently reduced by such doses of nitroglycerin as could be given with safety to the patient. Particularly important is it for us to always bear in mind the possibility emphasized by Dr. Anders, that a latent unilateral hydrothorax may develop at any time during the course of myocardical inflammation or degeneration and require early and prompt removal by the aspirator.

Dr. James Tyson: Whatever may be the more remote cause of non-inflammatory accumulations of fluid in the chest cavities I believe they are practically due to cardiac weakness or obstruction to the onward movement of the blood or to both combined. Taking, for example, interstitial nephritis referred to as one of the conditions in the course of which hydrothorax occurs, it does not present itself until the hypertrophied heart begins to dilate. The frequency of the invasion of the right chest as compared with the left might have been further illustrated by reference to the observations of the late Dr. J. Dutton Steele, who found that out of 100 cases 83 were double and 17 single, and that of the 83 double three-quarters were right-sided and of the 17 single 10 were right-sided. I find that the normal physical signs, that is, tactile fremitus and vocal resonance, are often heard with remarkable distinctness even where there is a considerable accumulation of fluid of this kind, when they should be fainter than they are. I know to my cost the consequence of minimizing the importance of these physical signs and of delaying tapping the chest when tapping might have saved the patient. I have learned that it is not well to wait for the effusion to become large if one is certain that it is present on one side or the other side. Often, too, when we come to draw off the fluid we find the accumulation greater than we had supposed.

Dr. Thomas McCrea: One possibility of error in the recognition of these cases lies in the fact that when the amount of fluid is not very large, the dulness is regarded as being due to increase in the size of the liver. The fluid may persist for long periods in these cases and sometimes increases and decreases without any special change in the cardiac condition. This is particularly seen in patients who refuse tapping. In some cases the removal of a very small amount of fluid is followed by rapid absorption of the remainder.

Dr. Anders, closing: I am glad Dr. Daland brought out the point that in some cases of hydrothorax digitalis fails to act favorably even

after tapping the chest. In such instances, strophanthus has also been found, in my experience, to give better results. What Dr. Tyson has said regarding the condition of the heart in all cases in which there is an accumulation of serous fluid in the pleural sac is perhaps well understood by most clinicians. My object in presenting this paper, however, was to refer to the cases of hydrothorax in which there was no external dropsy at the onset, and no valvular disease, and therefore little ground for suspecting the presence of fluid in the pleural sacs. In any case of nephritis in which we have oncoming secondary dilatation of the heart, associated with external dropsy, we expect the development of a transudate in the serous sacs and are apt to look for it. I want to emphasize the fact that we should systematically examine the thorax in chronic myocarditis, independently of either valvular disease, or chronic nephritis. I believe that right-sided hydrothorax of cardiac origin is more often due to myocardial disease than has been supposed by clinicians.

I would lay special stress upon the extreme latency of right-sided hydrothorax due to foregoing chronic myocarditis and agree with Drs. McCrae and Tyson in the opinion that we should do tapping early in the presence of a weak or dilated heart.

THE OPERATIONS FOR MASTOID EMPYEMA AND CARIES[1]

By B. ALEX. RANDALL, M.A., M.D.

In the decade since a previous paper on this subject (*American Journal of the Medical Sciences*, April 9, 1902), numerous writings have appeared with diverging views and recommendations, while an experience of some 500 additional operations has still better served to crystallize my teaching on this important matter. The influence of the grippe epidemics seems waning and the acute mastoid cases appear to be less frequent; yet the number of patients in whose behalf such intervention must be considered is enormous. Great differences exist in the clinical material and surroundings of different men. The slum populations offer little opportunity for a conservative attitude, and the crowded hospitals ministering to such localities can ill afford beds except for operative cases—surgeons so environed will naturally operate more promptly than he whose patients promise more for non-operative measures and who has beds in which to treat them expectantly. I have brought through without operation many a patient already shaved, as well as those ordered into hospital for immediate operation, by some other surgeon; but it is probably only from non-experts that I have received cases of furuncular swelling sent for mastoid trephining, although of these cases some are hard to differentiate.

Still more difficult is usually the diagnosis between empyema and caries here—indeed, there are many who make no attempt to distinguish, but holding them equally to demand operation, point to a drop or two of pus found in or near the antrum as proof posi-

[1] Read March 5, 1913.

tive that the case offered no alternative to such radical drainage. Leidy's teaching that the antrum is as much a part of the tympanum as the attic or the lower drum-cavity is only gradually being learned by otologists, persistently as some of us have been insisting upon it. Those who consider every pus-filled cavity an abscess to be torn open, get little chance to learn that the majority of acutely empyematous cavities can successfully drain by their natural channels. The Highmore antrum and other nasal sinuses are being less frequently attacked in their acute empyemas and will be still less opened in the future. Too many have accepted pseudo-authoritative statements that the mastoid can never free itself of pus and have applied them to the "mastoid antrum." The observer who has watched the pus flow from the pharyngeal mouth of the Eustachian tube cannot *prove* that it comes from the antrum or mastoid cells; albeit threatening symptoms there decline in reasonable coincidence, and the patient makes full recovery.

Yet there will be many cases of mastoid empyema in which operation will be called for before any positive diagnosis of caries can be made. The stormy onset of symptoms, the impaired resistance of the patient, especially as shown by leukocytosis with high polymorphonuclear count or septic blood-culture, the finding of virulent organisms in culture or smear from the ear—even the limited experience of the surgeon, which forbids his taking risks which another may be justified in running—any of these may demand intervention while the issue is still in doubt. It must be remembered that operation before demarcation has its drawbacks, if not its actually increased risk. There is much in the claim made years ago by Sprague, of Providence, that a mastoiditis must *ripen* before it is best to open it up, if the safest, quickest cure is to be gained; although I must admit that I never wait a needless hour after I have decided that operation is unavoidable. Further, there may be cases in which operation on the mastoid may conserve the hearing, which might be sacrificed by an otherwise successful non-operative care. If this be true, it does not prove that operation could have saved the function in any individual case; but it certainly offers food for thought.

The symptoms of mastoiditis generally include the classic four—heat, redness, swelling, and pain; but any or all of these may be lacking. Most of them are signs of an external periostitis, such as a deep furuncle of the canal may cause; while they may all be absent in a carious affection separated from the surface by a dense layer of normal bone. Under such conditions penetration may take place downward into the diagastric fossa, with all the swelling in the neck. These patients may suffer extensive burrowing of pus along the great vessels; and septicemia generally ends the affection before the pus invades the mediastinum or pericardium, as has been a few times reported in neglected cases. Rupture may take place into the external canal, where swelling and sagging of the wall is in many instances an early and important but not pathognomonic symptom. Too often the line of least resistance is inward, even though other exit is present and seems free. In the majority of my operated cases caries of the inner table has been found, often with notable extradural abscess between the affected bone and the granulating dura. This intracranial extension may be into the middle or the posterior fossa, especially often along the sigmoid sinus; but even when extensive I question if it furnishes any symptoms of its own. While many writers have set forth a list of signs of extradural abscess, these were absent in scores of cases in my experience, or when found were due to leptomeningitic or cerebral involvement.

Upon the mastoid surface inflammatory signs, even fluctuations, are not unfailing symptoms of caries. Pus may have burrowed out along the canal-wall from the attic and lifted the whole temporal muscle. Edema, even in a severe furuncle, may so simulate fluctuation as to be indistinguishable, at least in a shrinking, unanesthetized patient. One test rarely fails: if the index fingers are pressed upon the swelling until deep pitting has expelled the serous infiltration, even a drop or two of fluid can be felt beneath the periosteum. The fingers should be in vertical line; if one is back of the other, the mobility of the sternomastoid near its insertion may deceive. The canal should be wiped clear before this and studied at once after it, for if all subperiosteal pus can be evacuated

into the meatus none may be felt on the surface. This pressure, which may be unbearable to a mastoiditis, proves rather a relief than a torture in furuncle, if exercised without imparting motion to the canal. Tenderness of the mastoid over the antrum or at it tip *is the rule* early in all severe tympanic inflammations—its later appearance is of graver meaning. Edema behind the mastoid may indicate phlebitis of the emissary vein or of the lateral sinus; tenderness here may point to perisinous abscess not yet seriously involving the venous wall. Mere mastoiditis, the painful red swelling of this region, blurring the details of the underlying bone, is commonly a trivial and fleeting matter, as I can attest upon the basis of more than two thousand cases brought to prompt and safe resolution during the past thirty years by rest in bed, hot applications, and rational antiphlogistic means. I have had a dozen such in the past month or two. The temperature, pulse, blood, eye-grounds, and neurologic reflexes, with tests of the facial and acoustic nerves, should almost always tell the experienced surgeon whether he dare treat expectantly or must intervene without delay even in the absence of all pathognomonic signs.

In cases with chronic middle-ear suppuration several additional questions arise. Such patients are described as living over a powder magazine; but disastrous explosion is the exception, not the rule. Reason, not panic, should dictate our advice. If the case cannot be kept under observation and conservative treatment, a radical attempt at cure is safer than neglect. The operation of tympanomastoid evisceration is successful in perhaps 75 per cent. of cases; in some of the remaining 25 per cent. the condition is made safer and better; in a few, at least, we meet disaster which had not before seemed imminent. Data are not at hand to decide whether mortality is greater among the operated or the unoperated patients, although enthusiasts will admit no question that sins of omission are the more heinous. If caries is present in the middle ear it demands intervention; but this may be limited, almost microscopic. Those accustomed to delicate intratympanic work will always be open to accusation of finikin hair-splitting; but their patients thus cured without a dreaded operation will help

them to smile at the charge. Cholesteatoma, the formation within the tympanic cavities of laminated masses of epidermis, urgently demands relief; but this may often be conservatively afforded—it is not an invariable indication for radical operation, as has been claimed. It is mainly upon chronic suppuration that sinus thrombosis and brain-abscess supervene, as well as many a disabling labyrinthine caries or fatal meningitis. The "immunizator" will be able to cure some of these cases with his bacterins; many can be conquered by minor measures; some must be radically operated on.

If major operation seems needful, or at least offers the lesser horn of the dilemma, three or more procedures present themselves for choice. The rational surgery of this region demands evisceration of the seriously diseased tissues as well as good drainage. Here, as elsewhere, the "vis medicatrix naturæ" can do much; but the important surroundings endangered make half-way measures too precarious. Even total destruction of the auditory and equilibratory functions must be done at times that life may be saved; but this argument must not be too far-fetched or hysterically applied. Each of us stands in hourly jeopardy of death; but we do not rush to surgery for the removal of every remotely possible contributing factor. We need not amputate the whole temporal bone because of some caries within it, any more than we are called on to remove its fellow, lest it too should become involved. The operation must meet the conditions and be carried as far as the findings lead; it should not be planned as a "complete mastoid operation" that as a blanket-measure shall cover every case—unless, like Procrustes, we are also to stretch or retrench every patient to fit our operating table. The old boring into the mastoid for mere drainage would too often prove inefficient as well as too dangerous; I have seen it, demonstrated on the cadaver by a good general surgeon, penetrate the brain, as in the notorious case of Berger, which set back this work for nearly a century. The cortex of the mastoid should be chiseled in thin layers at the point of election until, the antrum having been opened, the pathological need for any further steps has been revealed. This point of

election is usually at any softened or fistulous area, or in absence of this at a point about 5 mm. back of Henle's *spina supra meatum* (Fig. 1). Some surgeons have attempted to describe a "post-meatal triangle" as anatomically defined and surgically safe. Only its upper anterior angle is fairly constant, being marked by the spina or the little pit back of it—one or both of these landmarks is almost invariably distinct. A couple of thousand meas-

Fig. 1.—Horizontal section of skull showing Henle's spine back of each external auditory canal and its close relation to the tympanic antrum.

urements have showed me no instance in which the floor of the middle cerebral fossa came lower than the spina; and there is an average space through which we can chisel to the antrum of 10 mm. between it and the sigmoid sulcus. Yet we must be prepared to find no room for operating at this point, and must so chisel that we shall not wound the dura laid bare at the first stroke (Fig. 2). Schwartze and others have described a course of the facial nerve

so anomalous as to be here exposed; but I have never seen such a relation; not even in a specimen claimed to demonstrate it. As a rule the facial is out of harm's way until the deeper part of the canal is attacked or we have passed through the antrum to the semicircular and facial canal forming its inner wall.

FIG. 2.—Temporal bone horizontally sectioned through upper part of auditory canal, showing sigmoid sulcus almost uncovered at usual operation point just back of spina, on the left side of a dolichocephalic skull.

Chiseling or curetting, the mastoid can be opened to afford needed drainage and to expose for removal all carious bone. This can generally be recognized by sight and touch, but good judgment will often dictate curetting away of bone so evidently infected that it cannot be considered viable; yet I cannot commend except to the inexperienced, who has not learned when to end his intervention, that he shall "destroy every pneumatic cell of the mastoid and explore the root of the zygoma" for the cells only sometimes found there and much less frequently involved. Caries of the zygomatic cells has been met in hardly 1 per cent. of my operative cases; and I can recall but one, a tubercular man, in whom they later became involved and slightly delayed the healing. Cells not freely drained by the operation may later show infection and retard the cure; but there will be as good reason to suspect

that they were infected by the intervention carried needlessly beyond the "acclimated zone," as that they were neglected at the operation. When we consider that the pneumatic spaces of the tubo-tympanic system extend far beyond the mere mastoid, invading any portion of the temporal, even to the *sella turcica*, and may pass back into the occipital or down into its condyle, it is evident that the advice to open every pneumatic cell, whether it shows need or not, entails practical amputation of the temporal. I have never pretended to attempt it; but limiting my work to the tissues that seemed diseased, rarely meet a suggestion that it should have been more radical.

Thus far eviscerated in the acute cases, the mastoid is generally ready for prompt healing, usually under blood-clot and primary closure of the wound; and the suppurative flow through the drumhead at once ceases. Yet where the mastoid caries is due to chronic tympanic suppuration, we long since found that a merely mastoid intervention is inadequate. The tympanum must also be eviscerated if its condition is to be cured and the cholesteatoma-formation there brought to an end. For twenty-five years I have been preaching that "cholesteatoma is the cause of chronic otorrhea"—a rule with only enough exceptions to prove its truth. Aural surgery has been dealing more vigorously with these chronic suppurations during this quarter century, removing the drumhead and ossicles to improve drainage and access, opening out the attic that it may not pocket the process, and, often failing with these, opening the antrum also. They who regard the antrum as a mastoid cell, as the majority still do, see in its involvement a disease of the mastoid, however devoid of mastoid symptoms the case may be; and not content to eviscerate the tympanic cavities, they have been doing "radical cures" by eviscerating mastoid and tympanum alike and throwing all of these cavities into one to dermatize as a large diverticulum of the external canal.

This "tympano-mastoid evisceration" is the proper procedure in mastoid caries due to chronic otorrhea; but it is as irrational to tear out the mastoid in the tympanic case as it would be to eviscerate the tympanum in every mastoid case. The "tympanic

evisceration" advised by Stacke, in 1888, meets the needs of most of the persistent suppurations, and has given me a high percentage of cures in a series of cases grudgingly selected because they had long resisted thorough and vigorous use of measures through the natural passages. Diametrically differing from the Wolff method of opening mastoid empyemas through the back wall of the canal without touching drumhead and ossicles, which Heath of London is now exploiting, this intervention removes the wedge of bone separating the attic and antrum from the canal (the scute, Leidy), together with the drumhead and any remains of malleus and incus, and grafts into the cavity a delicate skin-flap which shall assure and hasten its healing open. Exit is thus given to the cholesteatoma collections, and their matrix is curetted away, carious areas are sought and extirpated, and access is made easy for the future. The operation should not injure the stapes and the healing need not greatly impair its mobility; so a fair amount of hearing is often secured and retained. The curetting is easily extended out into the mastoid so far as there appears any reason to go; no noticeable scarring is left to annoy the most fastidious; and yet the operation can be thorough and of lasting success. For the surgeon not unduly endowed with thumbs, to make room for which he must chisel away the whole undiseased mastoid, or who aims to satisfy himself and not some critic who does not know the case, this "tympanic evisceration" can be ideal.

It is best done by laying forward the soft tissues, including the lining of the auditory meatus, and placing a gouge upon the upper back wall of the naked canal some 10 mm. external to the drumhead, to gently work a notch (such as the boy cuts in his willow whistle) until the attic and antrum are open. Only a bridge of the bone-margin then remains, protecting the deeper-lying facial nerve; this can be thinned until no longer strong enough to be safely chiseled against, when it can be curetted away by outward traction and the evisceration of all three tympanic cavities completed as the diseased conditions demand. The soft tissues corresponding with the bone-gap, which would span it if replaced, are then split into layers, giving a periosteal and a skin-flap each

of the full size of the available tissue, and these are lightly tamponed into the cavity, where they quickly cover the walls with a delicate lining of normal skin.

Most men, however, are not content with this, and regard it as finikin and incomplete. They tear out the whole mastoid to convince themselves that it is not carious and regard askance Nature's eburnation there, which has conservatively filled up into solid bone much of the diploic and pneumatic structure; they want more room in which to manipulate, and amputate the mastoid process lest it later become involved. The large cavity formed can less well be covered in for dermatization by local flaps, especially if these are as usual only half utilized. Thiersch grafts from the thigh or elsewhere are generally introduced—sometimes by another operation under general anesthesia a week or two later. Three to six weeks is mentioned as the time required for the dermatization; but three months rarely sees the ear more than "practically dry;" and repeated "radical cures" are far from rare or invariably successful. Our clinics are full of the failures, which naturally are far more in evidence than the successes, yet probably constitute quite 25 per cent. of all thus operated on. Schwartze, whose experience was huge and his cases followed as is not possible in our large cities, gives the failures as 26 per cent. The aurist conservatively inclined, who sedulously employs non-operative methods in these chronic otorrheas even after they have been urgently advised by others to have evisceration, who builds up their depraved health, uses tuberculin in suitable cases, and shows the patients how to care for themselves, will see many a cure at least as prompt and lasting as operation could have secured; while he will, I believe, see less than the operators, rather than more, of the serious intracranial extensions.

Wholly different is the "tympano-mastoid evisceration" when done for mastoid caries in these chronic suppurations. This is no "operation of election," but with indications which need no hysterics to consider them vital. The inner table of the temporal may be gone and marked pachymeningitis or extradural abscess be present; the facial nerve is threatened with permanent injury;

the bony labyrinth, if not the membranous, may be already involved and meningitis or brain-abscess really imminent. External symptoms of redness and swelling are far less usual than in the acute lesions; but deep-seated pain, fever, arrested discharge, high polymorphonuclear count, perhaps rigors and vertiginous crises, may plainly forbid expectancy and warn us that if we wait for more localizing symptoms we may be too late. If a concurrent appendicitis or other lesion raises a question of alternative causation of the general condition, it is better to strike both under the same etherization, as John B. Roberts and I have done. The operation should be prompt, exploratory, and thorough as to the disease found.

When there is no question as to the need of eviscerating both mastoid and tympanum there is little advantage in clearing the tympanic cavities first and working out into the mastoid cells; quicker work can probably be done from without inward; and as we may have a very extensive operation before us, no time should be wasted. The mastoid cortex can be opened as in the simple mastoid evisceration until the antrum is entered, then the upper back wall of the meatus chiseled away or bitten out with the rongeur until the "bridge" of tympanic margin is removed, the tympanic cavities emptied of ossicular remains, cholesteatoma and granulations and all diseased surfaces carefully curetted. The Eustachian tube-ending is then scraped—both to secure if possible its healing shut as a bar to future infection from the nasopharynx, and also to destroy the small cells here, which like those at the lower back part of the tympanum are apt to prove lurking-places for the infection. This requires special caution, for the carotid in front, and the facial nerve and jugular behind are feebly protected by thin and probably softened bone. The soft tissues are now utilized as plastic flaps toward covering the bare cavity walls, supplemented if desired by Thiersch grafts now or later; all such tissue being best held in place by light tamponing with gauze strips or cotton pellets.

In either form of mastoid evisceration the cutting can be done with the hand-gouge, even in the eburnated bone usually met with

in the chronic cases. I practically never use the mallet and cannot hold it innocuous in cases of intracranial involvement. The curretting and chiseling can be done with fair freedom downward and forward; but work up or back should be left until all else has been practically finished, because in both of these directions the dura may be bare through loss of the inner table and even the brain uncovered by dural ulceration. I have found the tympanum already filled by "fungus cerebri." It is not well to bare the dura bunglingly and unawares, for it is too easy thus to injure the brain or the lateral sinus; but I have never seen reason to regret exposing the dura for cause. Even probing may open the lateral sinus, and the surgeon's finger must be ready to close the opening at the first gush and his packing ready to replace and maintain its pressure; but I have yet to see any harm from it beyond the blood-loss. Such an accident generally prevents further intervention for a time, so it is important that other steps be finished before this risk is encountered. Granulations covering the bared dura are doubtless superficially infected, yet they are generally non-absorbing and more protective than the curetted surfaces which would be left by their removal. They should not be covered by skin-flaps, but may be stimulated to healthy condition by packing.

The crux in the cases in which the tympanum is eviscerated is to clean up the infected cavities without doing injury to the facial nerve. This can generally be accomplished by bearing its position well in mind and avoiding it. We know that it passes just above the oval window, which can usually be located, curves sharply down just back of it, and descends vertically to the stylomastoid exit. This vertical portion passes 2 to 4 mm. behind the middle of the back margin of the drumhead; above this it is internal to that margin, so that the back wall of the canal can be removed thus far with little risk to the nerve. Yet as the canal-axis usually points upward nearly 10 degrees and as much forward, the course of the nerve may seem more oblique, and a slanting ridge of meatus-wall has to be left to protect it. To clean out all the diseased bone or even all that is carious may require us to lay bare the nerve; and only by the most skilfully delicate chiseling can this be done

without injury. Merely to lift the nerve left naked by the carious destruction of its canal seems enough at times to paralyze it. The claim can fairly be made that expert operators can uncover the whole length of the facial here and attack diseased bone beyond it with little or temporary paralysis; whereas its spontaneous involvement is more apt to leave permanent disability. So sins of omission may be worse for the patient than unfortunate but rational zeal to complete the evisceration. To watch the face of the patient seems an inefficient substitute for knowledge of the anatomy; its twitching often marks the completion of the injury.

Paralysis of the face may follow a perfect operation if the packing of the wound press unduly upon the facial; it is more often a neuritis than a severing of fibers. Recovery is the rule, but with slow return to perfectly simultaneous and equal action of the two sides, and can be greatly aided by persistent light pinching of the affected muscles. This can be done from the first and maintains the vitality of the nerve-endings, when it is not yet safe to use electricity. I have seen recovery, far surpassing any results from anastomosis, thus obtained after four years of persistent paralysis.

FURTHER OBSERVATIONS ON THE VALUE OF STUDYING THE PULSE RATE WITH THE BLOOD PRESSURE IN CROUPOUS PNEUMONIA[1]

By H. A. HARE, M.D.
PROFESSOR OF THERAPEUTICS AND DIAGNOSIS IN THE JEFFERSON MEDICAL COLLEGE

At a meeting of the College of Physicians in 1911 I read a paper in which I confirmed, from observations in this country, the statement of Gibson, of Edinburgh, that the relationship between blood pressure and pulse rate afforded valuable information as to prognosis and treatment in croupous pneumonia. To express it more exactly, the point is that when the pulse rate per minute is greater than the blood pressure in millimeters of Hg., the patient is in grave danger, and that even when the numbers are equal he is seriously ill. Further observation confirms this statement in croupous pneumonia in adults as a class, and I still believe that the comparison of the blood pressure curve and the pulse rate curve is a valuable guide to treatment. But just as there is no one dose of any one drug which will suit all cases, so it is also true that no one symptom or syndrome will prove of absolute value in every patient. My object in presenting this present paper is to point out some of the exceptions to the rule. It loses its value largely or completely in the following classes of cases:

In old people who have hypotension, as a result of their age and feebleness, before they are taken ill. Such cases also often fail to present that other tripod of croupous pneumonia, namely, the slow pulse, rapid respiration, and high temperature.

[1] Read March 5, 1913

The second class in which it fails is in children in whom the blood pressure is naturally low, so that the pressure and the pulse rate are normally nearer together than in adults.

The third class is in stout, flabby women who may be said to present some of the signs of a mild hypothyroidism.

The fourth class is represented by those cases in which the pneumonia is a sequence or complication of a severe illness like typhoid fever.

The fifth class is represented by pneumonia complicating diabetes. In all of these cases the relative slowness of the pulse rate as compared to respiratory rate is also usually lacking.

None of these exceptions, however, diminish the value of the sign under discussion in primary croupous pneumonia, or in that complicating the two forms of nephritis commonly met with.

In catarrhal pneumonia, in which the relative disproportion of pulse rate and respiration seen in croupous pneumonia is also absent, the sign described by Gibson and myself is also of little value, unless the catarrhal pneumonia occurs in a case of hypertension arising from a previously existing vascular spasm or arteriocapillary fibrosis, when it is of value.

Finally, I would like to call the attention of surgeons to the importance of studying the relation of pulse rate to blood pressure before, during, and after operations in adults, and particularly in adult males as a guide to stimulation and as to the wisdom of proceeding with operative interference.

DISCUSSION

Dr. James Tyson: I am in accord with Dr. Hare as to the value of the sphygmomanometer insofar as its specific application is concerned. But so far from saying that it has always been useful, I think it has sometimes been harmful in causing the patient to attach undue importance to the blood pressure, causing needless alarm in consequence. I agree with Dr. Hare that while the advantages of the instrument are exaggerated, it does lend a helping agent in the diagnosis of nephritis, in which

the pressure is almost invariably high. High blood pressure not otherwise explained almost alone justifies the diagnosis of nephritis. I have had some opportunities to compare the pulse rate with the measurement of the blood pressure in cases of pneumonia, and can confirm the earlier observations on this subject. His later studies I have not had an opportunity to reflect.

Dr. Richard H. Harte: I hardly feel like letting Dr. Hare's paper pass without making some remark with regard to the question of taking the blood pressure in persons long past the meridian of life; and I think what Dr. Hare has said throws a good deal of light upon many of our post-operative pneumonias. The taking of the blood pressure is not, I think, being done regularly in our clinics here in Philadelphia, and I think the omission is a mistake. There are many things today to be done that are not done, and this is just one of those steps which are sometimes left out. I think the matter throws light on many post-operative pneumonias.

Dr. Hare, closing: In regard to what Dr. Tyson said concerning the sphygmomonometer having done harm, so far as a patient expressing regret that this or that man is not careful enough to make the observation, that is merely a personl matter. So far as the use of the instrument does harm, in leading people to believe that they have serious disease because their pressure is abnormally high or abnormally low, I agree with him. I think it is a great mistake to let a patient know his blood pressure, for two reasons: (1) He attaches undue importance to what may be a temporary variation; (2) because he attaches undue importance to a variation which is so little from what we consider normal range that we may pay little attention to it. Further, if he knows what his pressure has been he is in a ferment of excitement to know what the result of his next examination is going to be. When a patient has his blood pressure taken and it is found to be 165, for instance; leave the cuffs of his arm, engage his attention and you will be surprised to find that it registers only 150. This leads me to bring forward another point with direct bearing. It is the universal idea that 130 is the average systolic pressure and that wide variations from this are to be considered abnormal. For example, I believe that all of us as we grow older, with few exceptions, develop a pathologic norm, a condition essential for our existence. As a man's blood vessels become a little less elastic the heart must drive blood more forcibly in order to get it through them. If the heart does not do this and does not maintain the high blood pressure, the patient has evidence of circulatory failure. I am frequently impressed with this fact in seeing cases that have been given large doses of the nitrites. The patient is in a worse condition than with a pressure at 160 because the blood paths have been widely opened and the heart is

not able to supply the peripheral tissues with the quantity of blood they ought to have because of the fall in pressure. This has a bearing in pneumonia because if the blood pressure is 160 when the case goes into pneumonia it is important to determine how much a high pressure is due to the onset of the grave disease and how much to the pathologic form. It may be that 160 is his pathologic norm. If the pressure of 160 is induced by the disease we ought to lower it. If on examination we believe that a blood pressure of 160 has been established by nature as a pathologic norm we do harm by reducing it.

In regard to the point made by Dr. Harte concerning the use of the sphygomanometer, I do not believe there is much use in using it immediately before the operation unless other examinations have been made. That is to say, if the pressure is noted by a resident physician at 10.45 when the operation is to begin at 11, we have not a great conception of the blood pressure. If, however, during the two or three days preparation for the operation the blood pressure is taken twice a day so that we get an average, then the interesting observation will be made that taking the blood pressure just before operation will reveal a pressure of 15 or 20 points above that ordinarily noted. While it is very troublesome to take the blood pressure during the operation, much valuable information will be gained.

Concerning the question of whether or not the anesthetic ought to be pushed at the critical point of the operation, or let up, I think most of the skilled anesthetists agree that it should be lessened. We know that the anesthetic acts only on the higher centres of the brain. The shock of the operation is exercised on the vital centres of the brain which are not influenced by the anesthetic. If we push the anesthetic we subject the vital centres not only to the shock of the operation but to the effect of the increased anesthetic. If the blood pressure is taken on the table you will sometimes see, for example, at the moment the testicle is taken out or as the uterus or kidney is extirpated, a fall in blood pressure which is sharp, between 35 and 40 points. This I think illustrates that we should not add to the depression of the vasomotor system the depressant of an excessive anesthetic at the critical moment of the operation.

THE TREATMENT OF NEPHRITIS[1]

By ROBERT N. WILLSON, M.D.

In dealing with the treatment of renal disabilities, it will be necessary at the outset to establish the fact that, except in the case of acute inflammation, we are called upon to handle the results of nephritis and not to deal with nephritis itself, as a concrete thing. Just as certain and vital, therefore, as is the damage beyond repair to structures essential to health and even to life, is the principle that the only effectual treatment of all other forms than acute renal disease consists of our recognition of the underlying etiologic conditions and the institution of prevention as the only form and means of cure.

It will be well in passing to refresh our memories with regard to the finer renal structure (vide diagram) and in so doing to recall the fact that the main recognized function of the glomerulus is the secretion of the watery elements; while that of the epithelium of the tubules is the extraction from the circulation (blood and lymph) of the substances that form the solids of the urine. In order to flush and cleanse the whole passageway to the calyx and the renal pelvis, the glomerule, with its water supply, is situated at the head or beginning of the tubule.

It is also of importance to recollect that a quantity of blood flows through the kidney each minute almost corresponding in weight to the kidney itself. Under such circumstances congestion will depend upon trifling causes.

And finally it is of interest and importance to remember, especially from the standpoint of possible renal infection, that the

[1] Read March 5, 1913.

inferior limbs of the pleuræ often approximate and cover the upper surfaces of the kidneys, and that the duodenum and the colon are in intimate relation.

Usually the term nephritis is employed to indicate a permanent chronic pathologic condition that is no more truly a nephritis than it is amenable to effective treatment or cure. Not only have

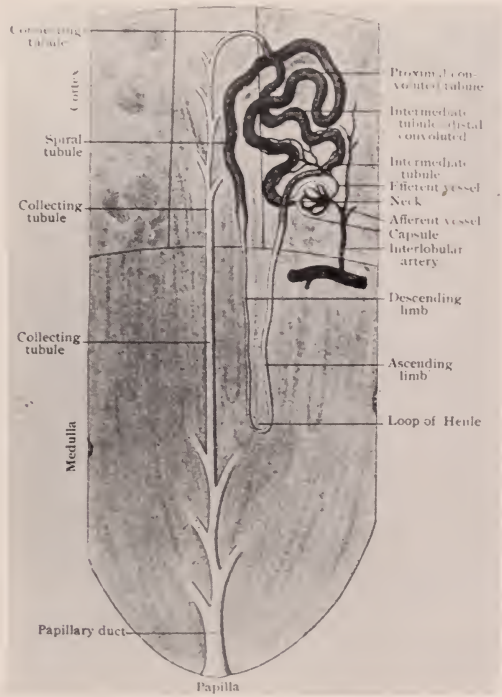

FIG. 1.—The course of the uriniferous tubule. (Piersol.)

the essential structures of both the glomeruli and tubules been destroyed, but their nourishing blood supply has been cut off, and their regeneration or replacement thus rendered impossible. We are therefore impaled upon the sharp horns of a crowding dilemma. The vascular, epithelial, and intertubular renal structures are in constant use, are never at rest, are indispensable to healthy existence. At the same time there is an increasing ten-

dency to habits of life, of eating and drinking, of drug indulgence, of overwork and overworry, of too little physical and nervous relaxation, all of which result in toxic influences and conditions that seem to assemble and collect their forces for an attack, as vicious as it is gradual and insinuating, upon peculiarly defenceless, vital agencies. It is almost as if there were working in the field an army of industrious and almost untiring peasant folk. Suddenly there begins a poisoning of their food and drink, of the very air they breathe, and in a little time even the tainted supply of nutriment is cut off. Already weakened by improper and poisoned food, these little cell peasants starve and die. The fountainhead of their source and origin having been also destroyed their replacement is impossible except by a type of tissue that is neither capable of performing their function, nor of acting even a negatively harmless role. It immediately begins to contract and to compress neighboring tissues, and to crowd and pinch them out of room. Therefore the inevitable must be faced, of a need imposed upon the vital forces of carrying on the processes of life in the absence of structures that are almost essential to its continuance, and absolutely indispensable to its well-being. On its face this is an impossible task. We are forced to recognize that, except by prevention, these conditions which are ordinarily termed chronic nephritis are incurable states. Only a makeshift can be instituted in the way of an alleviation of symptoms and a substitution for a little time of vicarious aid on the part of the other organs and forces.

The essential importance of this preliminary platform and the necessity of realizing its significance in the handling of renal disease become apparent when we study first the intricate renal mechanism, and next its duties as outlined in the gross and the microscopic renal specimen. Even in the kidney of acute inflammation (whether of chemical or bacterial origin) we see changes so marked and damage so widespread that it appears little likely that there can be perfect replacement or repair. The clinical events demonstrate that oftentimes such repair does not take place. In other cases there seems to be a complete reëstablishment. Probably

the only instances that we see of acute inflammation of strictly healthy kidneys are in children. Of these very many (about one third) die. Of those who recover (as the word is used), many have a renal disability, outspoken or latent, to which they later on succumb. A very few seemed to have suffered no permanent harm. Probably in the latter the actual destructive processes have not been carried on to any marked extent.

When we pass to chronic renal disease of the parenchymatous and interstitial types, we begin at once to deal with states in which the kidneys are damaged beyond repair. They may even be guilty of more than the nonperformance of duty, and may manufacture, in diseased conditions, what have often been termed nephrotoxins, to the further disabling of the body.

Three other points should be emphasized by way of preliminary:

First, that there probably never occurs, even in childhood an instance of purely parenchymatous, or purely interstitial renal disease. The degeneration of the glomerular and tubular epithelial cells may preponderate, or the process may appear to concern mainly the intertubular structures. But in either event, renal disease means disease of all the kidney tissues and always, as in the case of liver, or lung, or splenic involvement, we have a mixed pathologic and clinical picture. We call the one parenchymatous and the other interstitial disease, simply for the lack of a more intelligent method of describing the leaning of the individual case toward one type or the other.

Second, and of great importance from the double standpoint of treatment and prognosis, is the too little appreciated fact that the chronic forms of renal disease are usually only portions of clinical and pathologic pictures. By this I mean that in most instances the same process that has involved the kidney is also attacking the other vital organs. Or, as in the case of the arteriosclerotic granular kidney, the kidney fibrosis is simply one feature of the systemic circulatory disease.

The third point is, that in the vast majority of instances the individual case presents itself for treatment only at a time in which prevention is as frankly out of the question as cure. There

remains possible only the attempt to substitute other organs and functions, and to secure the postponement of the inevitable, sometimes for weeks, sometimes for many years. Given an individual with extensive degeneration and loss of the glomerular and tubular epithelium, and a marked contraction of the blood supply, and is a question whether the physician is likely to be much more than a witness of the steady progress of the patient toward toxemia and disablement of the vital centres. On the other hand, in an instance of incipient chronic interstitial fibrosclerosis of the kidney, very remarkable are the length of life and the degree of comfort and activity that can be vouchsafed, after the diagnosis has been made. Even here, however, as always in renal disease, the role of the physician is more one of prevention, than of cure, one of hygiene rather than one of medicaments or of mechanical methods.

ACUTE NEPHRITIS

Acute nephritis is, as a rule, an incident, often a serious one, in the course of some bacterial blood infection, whether in scarlatina, pneumonia, typhoid, diphtheria, syphilis, malaria, or other infectious disease. It may be either a unilateral or a bilateral suppurative process, occurring in the form of an abscess or of multiple metastatic abscesses, or it may and usually does consist of a diffuse inflammation.

In the former type surgical intervention and Providence furnish the only hope of cure. In the latter skilful treatment may go far toward assisting nature in resisting the attack upon the renal tissues and in her effort at repair.

The onset of acute nephritis is usually without warning, and admits of little more in the way of preparation than a general watchfulness for the signs of renal disability. An intelligently chosen and measured food supply will guard against internal treachery on the digestive side. Both in the acute and chronic forms of nephritis a clean bowel goes far toward prophylaxis, as well as toward a minimum of toxemia and serves as an active

preventive of all unnecessary renal activity once the onset has made the state of affairs known. A wide-open system of pores will prove invaluable in affording a free outlet for waste materials through the skin. But in spite of these hygienic measures the kidneys often suffer grievously in acute infectious

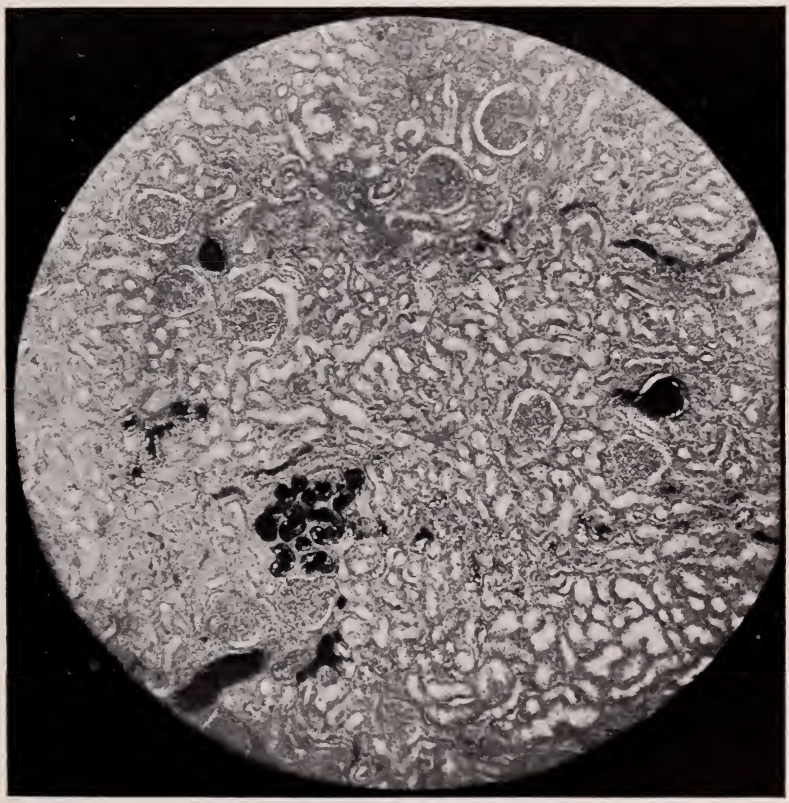

FIG. 2.—Acute hemorrhagic nephritis

disease, and oftentimes recovery from the effects of the latter is only secured at the cost of an embarrassed or crippled renal mechanism.

Acute nephritis may also occur independently of a recognized systemic disease. In such instances it is very frequently a colon

bacillus infection, as may be demonstrated by systematic study of the urine. Probably most instances of primary acute nephritis are of this type, even though apparently following and resulting from exposure, bodily exhaustion, or similar influences.

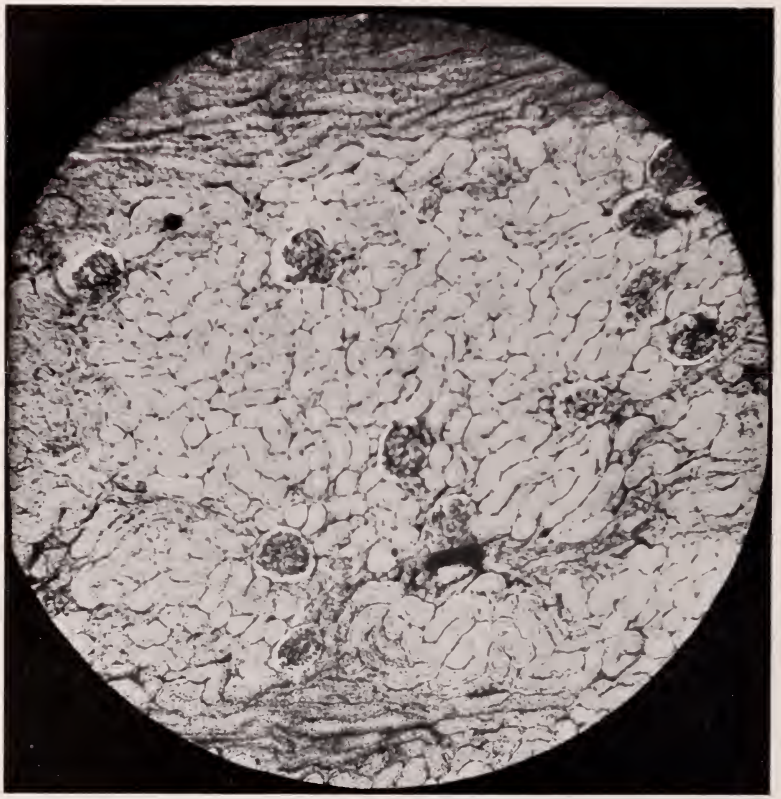

FIG. 3.—Glomerulonephritis. (Contrast the glomeruli with those in the preceding figure.)

The treatment of the attack consists of the employment of many of the same measures that were used in the days of Aesclepiades. Diet, regulation of exercise, and bathing were his trio of indispensables. Occasionally he accompanied these by purging and bleeding, or by the use of a bland drug. Our fathers imitated this ancient hygienist, and we are still prescribing absolute rest

in bed, starving, bathing, sweating, purging, bleeding, cupping, and occasionally administering a harmless medicament. The fact is plain, in short, that our treatment of acute nephritis is necessarily limited to an attempt to relieve the kidneys of all unnecessary duties, while Dame Nature is being relied upon to conserve the

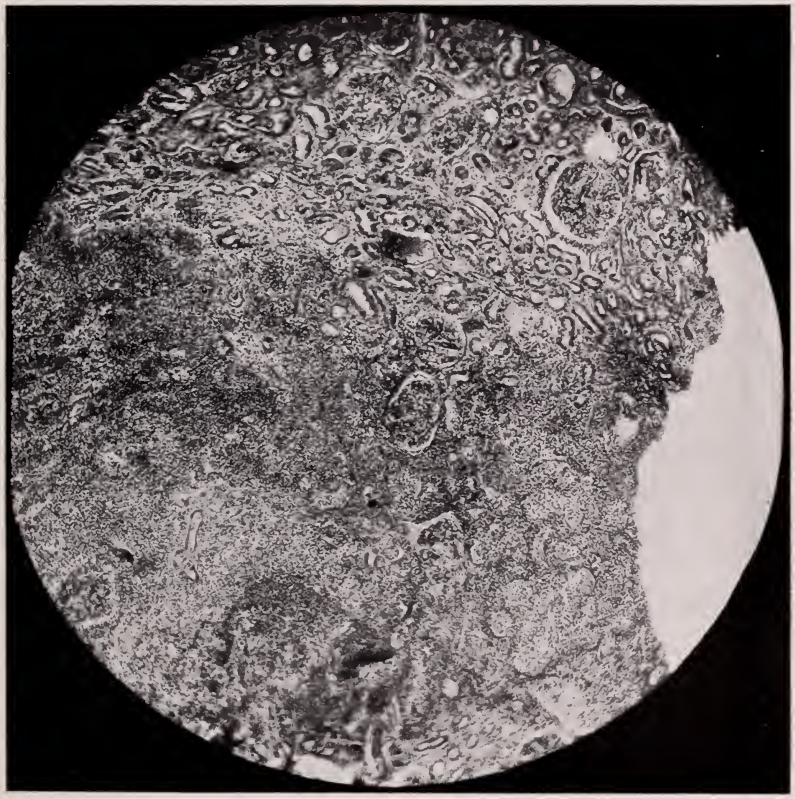

Fig. 4.—Pyelonephritis. Infiltration of the tissues with leukocytes.

essential renal tissues as best she may. In grave toxic states with marked arterial hypertension, bleeding and complete withdrawal of the spinal fluid by lumbar puncture may give immediate relief. Especially from the latter measure have I seen prompt and gratifying results both in children and adults. At

the present time I am watching and studying a uremic patient (a man aged sixty-two years) who has twice been relieved immediately of his stupor, cervical and general rigidity, and of a toxic and pressure irritability of the motor (left arm and leg) centres in the cortex, by the withdrawal of all the fluid in his

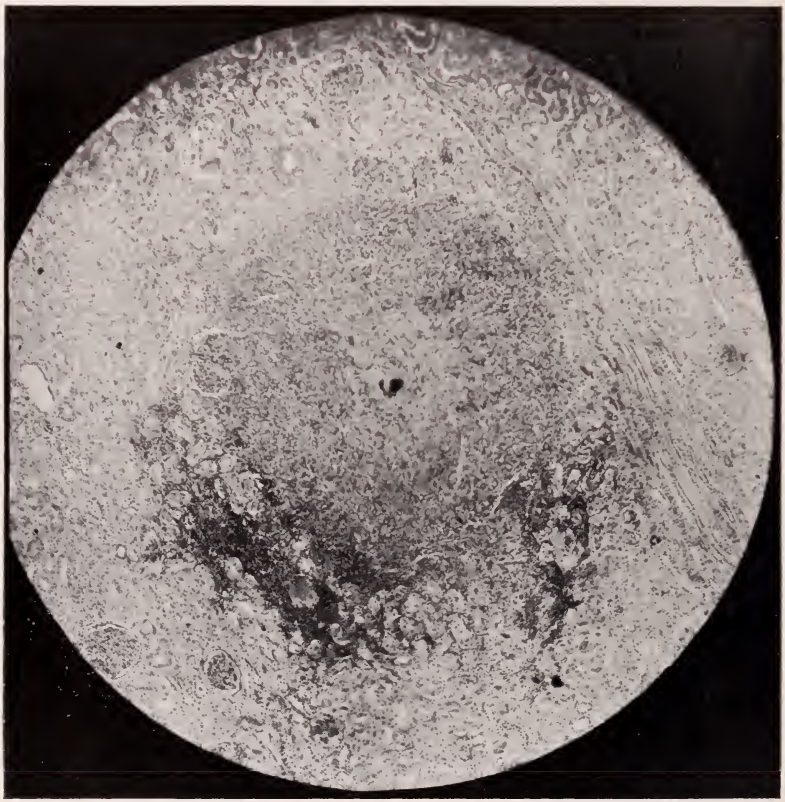

FIG. 5.—Embolic nephritis. Note the small vessels plugged with septic emboli, and the surrounding cellular infiltration.

spinal canal. He is one of many similar hypertension instances. Patients with low arterial tension have in my experience usually obtained harm rather than benefit from lumbar puncture.

As complete a sterilization of the urine as is feasible is often of the greatest benefit. Hexamethylenamin, salol, and acetozone constitute three drugs, any of which can be employed, with the

certainty of elimination through the tubules of the kidney, if the tubular epithelium is still capable of performing its function. Oftentimes the microscope will demonstrate in a kidney involved in an infectious nephritis, clumps of bacteria in the coils of the glomeruli, in the tubules, and in the form of emboli in the vessels. How effective urinary antiseptics are in reaching these bacterial foci is, of course, beyond the realm of demonstration. The attempt is at least intelligent and should be made.

Surgical measures have also been called into play. Capsule-splitting and decapsulation with or without omental investment have both been offered as means of relief from otherwise fatal mechanical kidney tension, and consequent interference with the renal circulation. No one can say, however, at the present writing whether in a given case surgical interference will prove a means of saving life or the additional burden that will carry the patient over and beyond all hope of cure. In certain instances it would seem as though the surgeon had not only saved life, but had afforded just the respite from renal embarrassment that has been necessary to tide the patient over into a new lease on both life and health. It would appear that to gain the full advantage from either capsule-splitting or decapsulation, surgical interference should not be delayed until the patient is moribund. Given an individual in whom suppression of urine appears more and more imminent, in whom toxemia is already under way, purging, bleeding, and lumbar puncture, and all medical measures, including hot sodium bicarbonate or normal saline enemas, having failed to stay the progress of the renal insufficiency—this would seem to be the case and the psychological moment in which to employ surgical help, rather than to delay until uremic coma or convulsions have supervened, or the patient has already advanced to the brink of dissolution. All of these strictly medical measures can be tested within a few hours; and, until those few hours have passed, so serious a procedure as a major operation should not be considered lightly. It matters little what type of acute diffuse renal inflammation is under consideration, as regards the invariable observance of this rule of conservatism and prudence.

Instances of acute nephritis that follow exposure to cold, wet, and exhaustion, and those that appear to depend equally upon the influence of alcohol and some latent disability, or upon a bacterial infection that finds in the severe exposure its opportunity to gain headway, all follow the same general rules of treatment and cure. Many irritants, such as turpentine and potassium chlorate seem to exert an especially unfortunate influence upon the renal tissues.

The acute nephritis associated with severe burns, and the true nephritis occasionally associated with the pregnant state, call for the same handling as has been outlined above, and seem to respond to the same intelligent management, if response is possible in the nature of the case.

Absolute rest in bed, a liquid diet, following a daily regular, gentle cleansing of entire digestive tract from the mouth to the rectum, scrupulous cleansing of the skin, sweating, hot alkaline enemas, cupping, bleeding, spinal puncture, these form the measures that may usually be counted upon to do certain good and no harm.

There is a possible temptation and tendency to curtail the oversight of acutely involved kidneys, and to release the patient from the restraint of the bed and of dietetic regulations before the renal parenchyma is capable of resuming its functions. There are no organs more essential to the life of the patient, and there are none that tolerate such a dangerous experiment with a greater certainty that, unless given full opportunity to reëstablish themselves at first hand, they will never cease to be objects and organs of concern. Many months of care and observation and judicious feeling of the way may be demanded before the glomeruli and tubules can resume functions that they have been compelled through violence to lay aside. In the treatment of acute nephritis, once the condition is clearly recognized, we are in certain respects far in advance of the stage arrived at by our fathers. We have the advantage of knowing a little more clearly the relation between certain toxic states and their resulting renal conditions; we also enjoy better facilities for both the home and hospital care of the

sick. But our principles of treatment of acute renal embarrassments are in great measure the same, and our results in terms of cure, I venture to say, are not very different.

CHRONIC NEPHRITIS

The treatment of chronic nephritis has gradually resolved itself into something other than a misguided attempt to replace destroyed kidney tissue, or to resurrect an ability to functionate in an organ which no longer possesses the structural qualifications for the performance of duty.

Studied with the kidneys of the so-called chronic parenchymatous and interstitial nephritis on the table before us, and with sections of the same under the microscope, we realize at once that we are dealing with conditions that should have been prevented, and that cannot be cured. We are concerned with definite and permanent results of destructive processes, which might once have been stayed or altogether forestalled. Thus the sclerosis that has scarred and deformed a normal into a contracted granular kidney, and stripped its tubules once and for all of their epithelial equipment, is the ground condition that marks the misnamed nephritis, when finally recognized, as already years old. There is as little possibility of rehabilitating such a crippled mechanism, as of restoring the abilities and capabilities of the posterior ganglia and columns in tabes. Indeed, the pathologic processes in tabes are of a similar character, and the treatment to which the physician must resort is very like in kind. In tabes other organs must be induced to substitute for the nervous centres, and the muscles at the periphery must be educated to take up new responsibilities and a new work. So when their power of functionating is lost to the kidneys, in small or large measure, their duties of excretion, selection, and elimination, must be shouldered in just that measure, vicariously, by the heart, the bowel, the skin, helped just a little by the hygienic direction of the physician. Fortunately or unfortunately a large portion of the kidney structure can be dispensed with before these organs begin to manifest their

insufficiency through clinical signs. Owing to this fact, and because of the ability of the other organs to lend a hand, as it were, nephritic mankind is oftentimes enabled, like the tabetic, to stumble along for a time fairly comfortably, with surprisingly little capable kidney substance at his command. In a word the treatment of chronic nephritis includes very little in the way of handling of the kidneys as such. The kidneys of chronic nephritis might almost as well not be in their places. They are almost past using This is far from saying that there are no definite practical measures that will yield, in many cases, gratifying results. Especially in instances of sclerotic kidney, it will depend largely upon the guiding influence of the physician and the intelligent obedience of the patient whether the latter lives two or three years, or fifteen or twenty. He may even be led into an old age, and die of some ailment that has very little relation to his renal disease. I have seen more than one example of this occurrence. I well remember one of the professors of my undergraduate student days telling his class of a patient who had heard from him with long and serious mien the verdict that had consigned him to an early death, not farther distant than the succeeding second year. This patient had insisted on having the gloomy prognosis in writing. "And," said the professor, "somewhat to my chagrin he has for fifteen years been exhibiting his death certificate to his friends and neighbors as something of a joke on me."

The wider the opportunity one enjoys to study nephritis both from the clinical and the laboratory aspects, the more readily he divides the cases at least from the standpoint of the treatment, into two sharply defined categories. The one consists of patients that can live long and comfortably, provided they follow a carefully prescribed regimen. The other includes the cases which in the face of every effort run their course rapidly and progressively to a fatal close.

The sclerotic chronic processes of the kidney form the bulk of our nephritides. Let us for the sake of thoroughness, however, consider first and very briefly, the handling of the second type, the so-called parenchymatous involvement.

We have already stated that there occurs no instance of purely parenchymatous or exclusively interstitial tissue change. The kidney that presents a parenchymatous inflammatory process, that has advanced beyond the earliest acute stage is already involved in and by a certain degree of interstitial implication. Similarly, the framework of the kidney, the intertubular structure, is never attacked alone. The glomerular and tubular epithelium participates to some degree in the consequences, if not in the actual stress of the inflammatory storm. Clinically, however, there is no resemblance. From the standpoint of treatment, the two processes might as well have no microscopic features in common. And because of this clinical and therapeutic cleavage it will repay the effort to review the methods in vogue for the treatment of the various clinical types, and for these to construct, if possible, a sane working outline of the rational treatment of renal disease.

CHRONIC PARENCHYMATOUS NEPHRITIS

In this type of nephritis the functions of the kidneys are more or less completely set aside in proportion to the amount of damage suffered by the glomerular and tubular epithelium. The poisons ordinarily excreted by the kidney are now retained in the body. As a consequence, every tissue in the individual is influenced, including the heart muscle, the vessel walls, and the central nervous system. Every red blood corpuscle carries and the blood plasma contains a certain quantity of nonprotein nitrogen. As a consequence the character of the blood and the ability of the heart to furnish the kidneys and the other organs with a proper supply of oxygen and other nutriment are both impaired. Thus is established a vicious circle that promises a progressively destructive change in the organs originally the seat of disease. First the degeneration of the epithelium, then the poisoning of the vital centres and tissues (including the blood), further impoverishment of the kidney structure owing to poor blood supply, then another wave of destruction of the renal epithelium, until the organ is

no longer capable of functionating. Death usually ensues within the space of two or three years, often in a much briefer time.

Rarely a patient recovers. We have before us, then, a problem involving the prolonging, rather than the saving of life. If a drug like tobacco, or alcohol, or mercury, or salvarsan, has been the

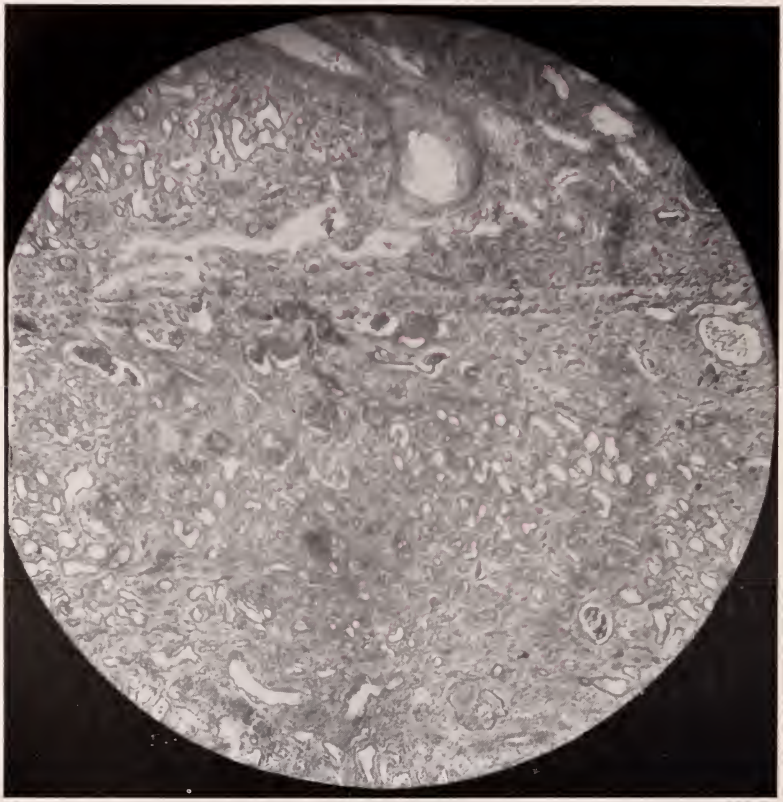

FIG. 6.—Chronic parenchymatous nephritis. Also hemorrhages into the intertubular tissues.

active factor in producing the condition, our first step must of course be the complete withdrawal of the cause. Few physicians and fewer patients realize how long the store of a given drug already within the normal human economy remains before its final disappearance by excretion. With the kidneys out of com-

mission probably there is only a very slow and very slight reduction in the quantity day by day. There may be none. Both mercury and salvarsan are selective poisons for the epithelium of the convoluted tubules. There are forms, however, of syphilitic nephritis, in which active antisyphilitic treatment with these drugs is the only means of curing the nephritis. In such a case it is a simple question of choosing the lesser of two evils, and of balancing the influence of the drug poison against the toxin of the much more dangerous and destructive spirochæte.

We must not allow ourselves to forget the intimate dependence of the kidney for its power to functionate upon the integrity of the nervous system. Jungmann (*Münch. med. Woch.*, August 12, 1913) has recently shown that either a puncture of the fascicle of nerve fibers to the side of the mesial sulcus and beneath the floor of the fourth ventricle, or a severing of the splanchnic nerve, causes polyuria and an excessive output of sodium chloride. Meyer of Strasburg had previously shown the influence of the spinal cord upon renal function. He claims that the increased quantity of urine and the overexcretion of chlorides are due on the one hand to irritation of the vasodilators, and on the other to a direct excitation of the renal epithelium. We have in the nervous system, then, still another factor to be weighed when outlining the treatment of the given case of nephritis. Owing to the presence of certain toxins in the body and their damaging influence upon the heart and upon the bloodvessel walls, as well as upon the character of the blood itself, there is usually in parenchymatous nephritis a widespread edema which may not confine itself to the superficial tissues, but may tend more and more, as the tension falls in the circulatory system, to involve the serous cavities of the pleura and peritoneum, also the ventricles of the brain and of the spinal cord. It is very improbable that the kidney itself has any patent influence in the causation of the profuse edema of parenchymatous nephritis. In its failure to excrete the toxins manufactured elsewhere in the body it simply permits the causal factors to become operative. The failure of the cardiac muscle explains only in a small measure the infiltration of the tissues throughout the body. The elimina-

tion of the toxins, therefore, furnishes a third problem in the treatment of the disease. This can be accomplished only to a very limited extent through the skin. Tachan[1] has calculated quantitatively the amount of nitrogen and sodium chloride in the sweat of a number of cases of nephritis, the bath continuing one hour, and the total amount of sweat being collected. He found that the excretion of nitrogen was inappreciable (averaging 0.25 gram or less), but that the sodium chloride excretion, especially in the presence of marked edema, was considerable (1.3 to 2.05 grams).

On this basis, and with the definite conviction that the edema itself is due to the retention of toxic products which the sweat bath does not eliminate through the skin, it is hardly likely that the hot pack and the steam bath will be employed in future to the extent they have been utilized by their devotees of the past. In view of our inability to utilize the skin to any great extent in the elimination of the nitroten products, we will in many instances employ the bowel. Reference will later be made to this invaluable substitute outlet.

With these preliminary considerations before us, we are ready to outline the treatment of the patient whom we know we cannot save, except in a rare occasional case, which seems, in spite of all likelihood to the contrary, to contradict the rule, and as the result of its own inherent qualities rather than as the result of treatment, to recover.

Rest. As far as possible the patient should be placed at complete bodily rest. This method requires the bed, of course, as all other forms of rest are but a makeshift. Moreover, the bed should be both sanitary and comfortable. As to whether he should remain constantly in bed or only for a portion of the day, in most instances the prostration of the patient is all that is necessary to determine the continuous confinement. The sleeping and living rooms should be flooded with fresh air of a temperature agreeable to the patient. During the periods of improvement he may be encouraged by brief periods in the chair, in or even by being

[1] Deutsch. Arch. f. klin. Med., 1912, cvii, 305.

allowed to walk a few steps. He will soon realize, however, that his only comfortable hours are in bed, and will fall naturally into the practice of spending his entire time in the reclining position.

The dietary should be nourishing, but extremely simple. A sufficient number of calories should be provided to maintain the body as far as possible against the progressive wasting and exhaustion. Rich foods and those calculated to irritate rather than to nourish the kidney structures should of course not be ventured. But a strict milk diet is neither wise nor necessary. The amount of solids eliminated in the urine on an exclusive milk diet is as large as on a fiber or meat regime, while not nearly the amount of nourishment or satisfaction is obtained (the latter being almost of equal value with the nourishment). Fats and carbohydrates seem to make less severe demands upon the renal tissues than the proteids, and the carbohydrates less than the fats. Yet I can recall more than one patient in whose brief career an occasional fairly generous mixed meal, with a small portion of meat or fish, made him radiant and hopeful, and acted as the stimulus and beginning of a period of improvement. In cases in which headache, gastro-intestinal irritability, and drowsiness are prominent features the best results will be obtained by limiting the patient strictly to the carbohydrates. It is well to remember that the blood pressure can be modified considerably through the regulation of the food character and supply, and that while it is not advisable to aim at attaining a normal pressure in cases in which it tends to be high, none the less it should not be allowed to become excessive.

Few students of the dietary of nephritis persist in the feeling that a salt-free diet is advisable, except in cases in which the restriction of sodium chloride manifestly controls the edema, as it occasionally does. Many patients are not influenced by its withdrawal. In such the anasarca is most actively influenced, if at all, by a complete withholding of the proteids from the diet. Cooked eggs often seem to be fairly well borne. Salads, fruits, vegetables, and bread will furnish a fairly generous program. The main caution should be against the overfeeding of the patient.

Cardiac failure and uremia will be the spectres that will hover near the moment an excess of food is introduced into the alimentary canal. In no condition is it so true as in parenchymatous nephritis that the digestive capacity of the individual patient must be tested and then supplied according to its own particular need. Enough food for one individual will be too much for another seemingly identical in the main features of his case. The tendency to undernourishment, anemia, and final emaciation, must be borne ever in mind, and the "enough" limits must be set at a point that will be both considerate and judicious.

With regard to drinking water, I am inclined to believe from my own experience with many cases that more often an ample supply does good rather than harm. Again, it is a simple matter to test its effect upon the edema and upon the general condition. Certainly a definite amount is necessary to supply the body needs and to flush the overloaded kidneys. Moreover, uremia seems far less frequent so long as the patient enjoys a full water suppy. Too much water adds to the burden already greater than the kidneys can bear.

Alcohol and tobacco should be completely withdrawn in all cases in which there is desired as extensive as possible a postponement of the end.

Medical Treatment. Apart from a symptomatic treatment, aimed at the control of the inevitable anemia and cardiac asthenia, medicines will have only a little part to play in the handling of the case. Alkalies, especially in the form of the alkaline waters, often seem grateful to the patient, and of benefit to his kidneys. The intestinal tract should be swept clear, at least once weekly, the best means being some palatable preparation of castor oil. When this is poorly borne, one of the salines given in lemonade will prove effective and satisfactory. Not infrequently by this means a considerable portion of the tendency to intestinal indigestion and ulceration can be avoided. Iron preparations, especially the tincture of the chloride of iron, used for short periods at various stages in the disease, may exert a beneficial influence. One of the newest and most gratifying suggestions has been that of the

use of thyroid extract in parenchymatous nephritis. J. F. Percy[1] seems to have demonstrated at least a definite amelioration of the symptoms as the result of the use of this organic medicament. He advises the average administration of six 2-grain tablets during the twenty-four hours, gradually increasing this dosage after a week's time. He cites a number of cases from which both the cardiac and renal symptoms, as well as the large albumin content of the urine, were caused to lessen, and, in some instances, even to disappear. He believes that its influence is largely upon the "metabolic processes of nutrition, especially with reference to proteins." The natural comment would be that while we cannot expect by means of a drug to replace destroyed and essential renal epithelium, none the less if these claims are substantiated we shall welcome the first real medicamental lightening of the distress of this disease. One other measure should be mentioned in connection with drug therapy. Oftentimes the slow administration of a hot normal solution of sodium bicarbonate by the rectum will exert a most beneficial and grateful effect upon the condition of the patient. Sleep may be induced, and rest obtained for the weary nervous tissues that oftentimes seem hard put to it to withstand the influence of the toxins circulating in the fluids of the body. Given once daily, and preferably toward bedtime, such an enema will often turn a restless night into one that will shed its benefit over the entire next day.

Syphilitic nephritis calls for the judicious use of mercury and the iodides. Salvarsan and neosalvarsan should be withheld until all other means of control have failed. Except in the syphilitic form of nephritis mercury and especially calomel will prove dangerous instruments. I remember two instances of calomel poisoning from small doses in nephritis, one resulting in uremic aphasia, and the other in coma and death. When used at all probably the blue mass is the safest form of mercury for administration in these cases. However given, the drug should be hastened in its passage through the intestinal tube by a saline. I know of no positive

[1] Jour. Amer. Med. Assoc., November 9, 1912, and August 9, 1913.

indication for its use and am convinced that in nephritis mercury had better be omitted from the drug list.

Hydrotherapy. Warm baths, especially in the form of oxygenated water, also the carbonated Nauheim baths, may prove of positive benefit. Even in cases that exhibit hypertension, very

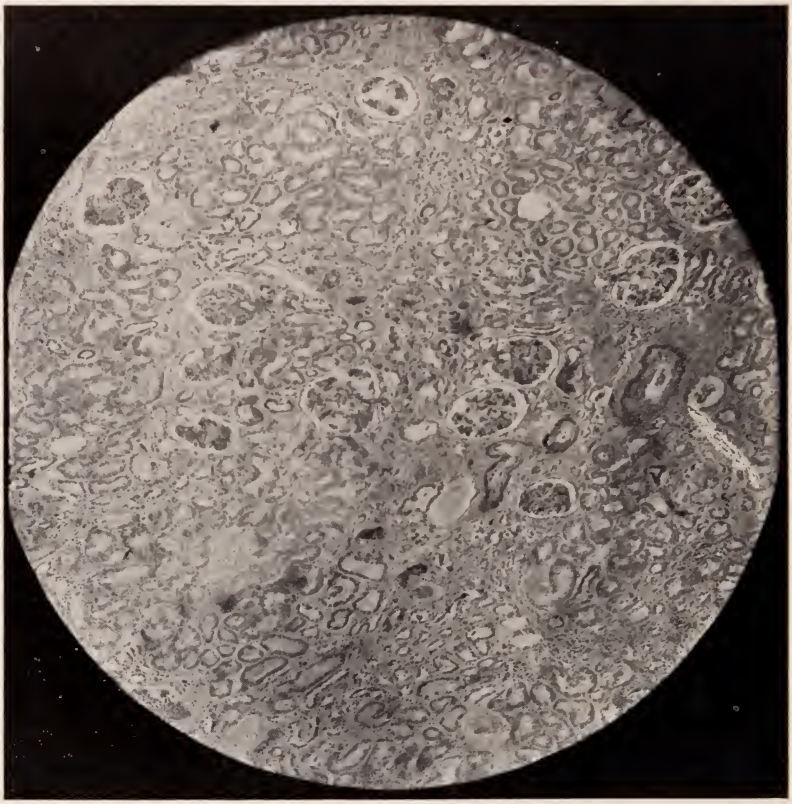

FIG. 7.—Chronic interstitial nephritis. Note the excess of contracting fibrous tissue.

frequently the heart and kidneys will both obtain advantage from a not too prolonged application of a medicated bath at a temperature ranging from 100° to 110° F. A bath of even two or three minutes in the beginning may gradually be lengthened to ten, fifteen, and twenty minutes, if agreeable to the patient,

and if found helpful in his individual case. If distressing it should not be repeated, and at the first sign of cyanosis or dyspnea the patient should be removed to the bed. If possible a portable tub should be used beside the bed. Free sweating usually follows such a bath with relief from many of the nervous symptoms and much of the cardial distress.

The ingestion of plain and alkaline waters and the administration of alkaline solutions by the bowel have already been discussed.

CHRONIC INTERSTITIAL NEPHRITIS

There is one time, and one only, in which renal sclerosis can be cured, namely, before it has occurred. There is also only one method by which chronic interstitial nephritis can be confidently treated, namely, by prevention. If the ground conditions that lead up to and develop into renal sclerosis can be recognized early and set aside, the physician will in this one step exercise a skill and cunning far less brilliant and remunerative, to be sure, but far more productive in terms of the salvage of human life, than by any other medical or surgical accomplishment. Patients die of arteriosclerosis, of apoplexy, of angina pectoris, of cirrhosis of the liver, and of kindred ills; but every one of these patients dies also of sclerosis of the kidney. And, perhaps, if the latter were not present, they would not die when they do.

There is one fortunate feature of the case. In sclerotic kidney the destruction of the parenchyma by the ever-contracting fibrous tissue is counteracted to a certain extent and for a time by the compensatory hyperplasia and hypertrophy of that portion of the epithelial structure which remains intact and capable of functionating. Thus, for a period, seriously involved kidneys may appear to do their full amount of work, and in a fairly normal manner. Cardiac hypertrophy soon supervenes and assists in masking the hidden insufficiency.

Whether it is true or not that there are three distinct types of sclerotic kidney is not of serious importance with reference to the treatment of the disease. It has been customary to describe a

primary renal sclerosis to which a sclerotic involvement of the circulatory system may be secondary (the result of toxins and hypertension); next, a secondary renal sclerosis in which arteriofibrosis is the underlying and causal factor; and, finally, the independent sclerotic involvement of the vessels and of the kidneys, without reference to one another. With respect to the preventive treatment this classification is only important in directing attention to the fact that in all three types the circulatory system and especially the bloodvessels (arteries and veins) are involved. There is also, perhaps, a suggestion of help in the similarity of causal conditions that must be prevented. The infantile form of sclerotic kidney is an inherited condition, frequently begun *in utero* and not seldom the result of congenital syphilis. The radial and brachial vessels of these little old men and women infants are usually hard and leathery fibrous cords rather than elastic, distensible tubes. No treatment can save these children, and death soon asserts its claim. Oftentimes it is difficult to prove the parents syphilitic. Born healthy and well, however, and free from specific taint, no individual under intelligent guidance, need acquire chronic interstitial nephritis. A perfect hygiene of mind and body will insure soft vessels and a competent heart and useful kidneys into old age. The perfect mental and moral and physical hygiene of which we speak will include, first of all, perfect cleanliness, the right kind and amount of food, plenty of water to drink, sufficient exercise to burn up the last atom of ingested food, a daily emptying of the intestinal tract, a full quota of rest and sleep, neither too much work nor worry in childhood or in adult life, freedom from alcohol and tobacco. The nearer we attain to this stage of perfect equipment, the more certainly we shall escape the possibility of developing fibrous arteries, and sclerotic renal disease, in whichever order they come. In fact we can come fairly close to the solution of the problem by excluding an excess of food, an unhygienic bowel, and overworry. We all eat too much, few individuals understand the hygiene of the bowel, and men and women of today are forgetting the little they ever knew concerning the principle that there is nothing to gain and everything to

lose in haste and worry. The physician in his study of a given patient, who may consult him for some simple ailment years before arterial or renal damage is under way, has the advantage of several signboards indicating this trend. One of these is the patient's own disposition. He may show in his speech, in his walk, in every gesture that he is of the hurrying, worrying kind.

He may be taught to masticate properly, to think and talk and eat moderately, even to take one step where he heretofore has taken two. His pulse and the tension of his vessels is the best of all telltales. A constant systolic pressure of over 140 mm. in young or old of average physical habit is always indicative of the need of care. Such considerations, of course, require more attention on the part of the physician than the all too frequent inspection of the tongue and the immediate issuing of a prescription. Once hypertension is even suspected the whole gamut of inquiries concerning the personal hygiene of the patient should be run and his or her intelligent coöperation secured after a full explanation of the objects at which the physician aims. Medicines will play a minimal part in the prevention of sclerotic disease of the kidney or any other organ. A saving of heart beats, and of energy, and of mountains of worry, will add enjoyment and years to a sanely busy life.

Once recognized as present in extreme or mild degree, sclerosis of the kidneys calls first of all for the same hygienic regime that would have been prescribed were we trying only to prevent its oncoming. We now have a damaged renal mechanism, a hypertrophied (and the beginning of a dilated) heart, and hypertension in sclerotic vessels in every tissue and organ of the body. We must remember that in all likelihood the process that has been going on in the kidneys has involved the stomach, intestines, lung, liver, and spleen. All are in some stage of fibrosis, and to that extent unable to fully perform their functions, at least when called upon in an emergency to do extra duty. Our aim must be therefore, as far as possible, to remove the cause of the kidney disability, to lighten the load of these vital organs, and by a hygienic manner of living to enable the patient to favor them in every way.

The dangers that threaten are (1) myocardial degeneration, and consequently cardiac dilatation and failure, (2) uremia, (3) apoplexy, and (4) angina pectoris. It may be that one or all of these can be prevented, and the attempt is well worth while. Often many years may be added to the life of a patient with chronic interstitial nephritis, provided he will live according to a hygienic regime. Among the causes of chronic interstitial nephritis are repeated attacks of acute nephritis, a long continued excess of food, arteriosclerosis and all its etiologic factors, the acute toxins of gout, diabetes, and syphilis, continued (moderate and immoderate) use of alcohol, tobacco, mercury, and poisoning with lead. Some of these influences we can set aside. Some, like arteriosclerosis, and perhaps syphilis, are permanent and constant factors, and must be reckoned with specifically to the end. An excessive indulgence in food implies an intestinal toxemia that need not and should not be allowed to continue. Its correction will not only remove an active, causative toxic factor, but will secure for the kidney structures an all-important rest.

Rest will be absolutely necessary in the beginning of treatment for the patient's mind and body. By rest is not implied confinement in bed, or even the chair. Rather does it mean relaxation from the tension in which the life of the patient has usually been spent. Usually it means ceasing all work for a time; and on resuming, the attempting only that which is found not to test lame organs beyond their ability. The urine may show considerable evidence that will prove of service in determining the course of treatment, or may indicate next to nothing. Its quantity, its specific gravity, its albumin content, its microscopic findings, its chemical analysis, will all have their significance. The hypertension in the circulatory system, and the presence or absence of anemia, will indicate the influence or absence of toxins circulating in the blood, and the need of special aid in their elimination. Rest to the heart, rest to the digestive tract, rest to the nervous system, will all mean physiologic and functional rest to the kidneys, and are much to be desired.

The dietary in chronic interstitial nephritis need not be a prison

fare. Probably the nearer it comes to a vegetable regime the more accurately it will conform to the ability of the digestive tract and the kidneys to assimilate and eliminate until only a harmless residue remains. The attempt should be made to determine just what can and what cannot be thoroughly assimilated, both as to the kind of food and the quantity. The blood pressure should be studied before and after meals, and at the beginning and end of the day. A certain moderate degree of hypertension (140 to 160) in a strong muscular man or woman should not be looked upon as excessive. While I do not believe that hypertension due to toxemia (such as that of sclerotic kidney usually, if not always, is) can ever be regarded as beneficial, still it may be said just as truly that a falling or low blood pressure in this condition is almost invariably due to a weakening or already insufficient heart muscle.

Just as in the dietary suggested for parenchymatous nephritis the proper nourishment of the patient is the desideratum. Toxemia is the result to be avoided if possible. The patient who is heavy and sleepy immediately after meals has had too much food for his digestive ability, no matter how small the amount. Another patient will eat twice as heartily and digest all. Again, rich foods and substances liable to raise the arterial tension must be foregone. The proteids are the least necessary and valuable, the carbohydrates the most essential at this time. I have not found it necessary to withdraw meats, even in most cases, from the diet. Even a healthy person, however, needs meat not oftener than once daily, and perhaps not so frequently. The sclerotic kidney naturally will not tolerate more than this allowance.

If the gastro-intestinal tract shows indications of irritability or even ulceration, the dietary must be restricted and especially chosen for the individual condition and patient. Eggs and milk will always be allowable, provided they are digested by the patient. Fresh fruits, and nearly all vegetables—except perhaps tomatoes and other highly acid varieties in gouty cases—will be suitable and helpful. Again, in sclerotic as well as parenchymatous nephritis alcohol and tobacco should be altogether withdrawn.

Intestinal Hygiene. There is probably no other one measure so essential to the prolonging of life in these cases as a scrupulous gastro-intestinal housekeeping. From the care of the teeth to the daily evacuation of the bowel the whole digestive tube should be a matter of special consideration. Probably there are made the toxins which cause hypertension. Their manufacture depends largely upon the retention and decomposition (rotting) of undigested food, kept for hours and even days mayhap, at summer heat, in a tube that can only with difficulty be rendered sanitary. A castor oil cleansing once weekly and a starvation day to correspond, will be of great benefit to these patients, as they would also to many well people. An abundance of water (not an excess) should be drunk during the twenty-four hours to insure the daily evacuation, and to supply the excessive amount of body fluids usually excreted by the glomeruli of sclerotic kidneys. Probably six glasses (a quart and a pint) daily will prove a fair average allowance, none being ingested after 5 P.M. If drinking water fails to insure a daily intestinal action, some simple laxative, such as the fluidextract of cascara sagrada, used in small doses three times daily, rather than in one large portion at night, will act as a tonic and stimulant for the bowel.

Hydrotherapy. In spite of the fact that sodium chloride, in all its methods of application, tends to elevate the blood pressure, occasional warm salt baths may and often do have a very beneficial effect. The Nauheim baths are being used more and more widely in cases that apper to be benefited, not injured by their application. Pure oxygenated and sodium bicarbonate baths may also be found grateful to the patient, through furnishing a tonic influence to the terminal nerve filaments and the vasomotor system.

A steam cabinet, used at night by the bedside to produce free sweating, I have found most helpful in removing toxemia and in warding off the signs of uremia. The bath should at first comprise only a few moments (3 to 5) of sweating. This can be gradually lengthened out to ten and fifteen minutes, as the benefits begin to appear. It can at first be employed once or

twice a week, and later may even be pressed into service at each bedtime.

Rectal enemas of a hot solution of bicarbonate of soda or of sodium chloride, slowly given, will often flush out an embarrassed renal apparatus, and clear away an impending uremia as nothing else will do save a lumbar puncture and evacuation of the spinal fluid, or a free housecleaning with castor oil.

Medicinal Treatment. All habit drugs, including alcohol and tobacco, should be completely withdrawn. The only drugs that are likely to prove beneficial to the case will be the tonic preparations of iron and the vasodilators (except the iodides), including thyroid extract, which in spite of its iodine content seems to exercise a beneficial influence upon both the kidney and the heart and the bloodvessels. Nitroglycerin (as long as the heart muscle is competent), aconite, veratrum viride are all useful drugs. Occasionally digitalis can be used in combination with these, for its cardiac and diuretic action.

The alkaline drinking waters will often be grateful and frequently beneficial to the patient with renal sclerosis. Both by the mouth and bowel occasional neutralization or alkalinization of the urine will seemingly counteract the toxemia that is ever knocking for admission. The action of the toxins of nephritis is similar to that of suprarenal extract—raising blood pressure, and at first stimulating and then poisoning and weakening the cardiac muscle. The occasional bleeding of a sthenic patient, evacuation of the spinal fluid when the vascular tension is high, both preceded by free catharsis, will sweep out the toxins from the body and lower the circulatory and intracerebral and intraspinal pressure as no other measures or medicaments will do.

The foregoing will constitute the general outline of the treatment of renal sclerosis. It will be observed that our objects are two: first, to stop further fibrous change in the kidneys, and secondly to prevent the formation and accumulation of nitrogenous waste materials and toxins in the body. By these simple means the patient may be safely guided for many years, so as perhaps even to reach old age, and to die of some condition other than active renal disability.

UREMIA

The treatment of uremia, so frequently an incident as well as the terminal phase of nephritis, especially of the sclerotic type, has been omitted until now in order to deal with it as a symptom complex almost independent of the renal disease. We neither understand the exact nature of nor the organs primarily at fault in uremia. The liver and kidneys are both apparently implicated to the extent of refusing to perform their eliminative functions, and possibly the ductless glands have some influence in causing the symptoms. The condition apparently consists of a toxemia dependent upon the circulation of some poison or poisons of the nature of adrenalin, both in their early stimulant action and in their rapid secondary toxic and paralyzant influence. The nervous centres are profoundly influenced and destructive changes (microscopic and macroscopic) have been frequently demonstrated in the brain and spinal cord. The vasomotor system of nerves is overstimulated to the point of causing excessive intravascular tension as long as the cardiac muscle withstands the influence of the toxin upon its nervous supply and upon its muscle fibers. When it yields the blood pressure falls and the uremic picture changes from one of hypertension to cardiac insufficiency, vasomotor paralysis, intravascular hypotension, and profound asthenia. Thus there are two types of uremia calling for treatment. The first is pictured in a patient with a heart still capable, in spite of a deep toxemia, a full bounding pulse, a fairly high temperature, usually delirium or coma more or less profound, and a mixed degree of vascular hypertension (160 to 200 and above). Uremic hemiplegia, or monoplegia, aphasia, or a cerebral bleeding in the course of the uremia, all are frequent phenomena. These hypertension or sthenic cases of uremia often respond favorably to treatment and recover sufficiently to seem perfectly well. They may experience several severe attacks before the final one which closes the scene.

The second type may be recognized in a uremic patient with a dilated weak heart, a rapid, running pulse, a low (often subnormal)

temperature, and a cold, clammy skin. The intravascular tension is low. The prognosis in such cases is almost uniformly bad, and the only possibility rests in the restoring of cardiac compensation and the lost vasomotor tone. Sometimes the asthenic type of uremia succeeds the hypertension form. Usually it forms a picture by itself, and from the outset offers no hope of alleviation or cure. These cases usually die slowly from sheer exhaustion of the nervous centres. The terminal phenomenon is frequently Cheyne-Stokes respiration in deep coma.

The treatment of these two types is as different as are the clinical pictures. The febrile, sthenic uremia with hypertension calls at once for the lowering of intravascular pressure. This may best be accomplished in one of three ways: (1) by purging, (2) by free bleeding, and (3) by spinal puncture. By purging we mean not simply the emptying of the sigmoid flexure and rectum, but a thorough cleansing of the intestinal tube. Salines given in small, frequent (half hourly) doses of concentrated solutions will prove the most effective means of accomplishing this end. Bleeding should be measured rather by the effect upon the circulation, than by the amount of blood removed. Usually not less than a pint, and more often a quart will flow before the tension is apparently reduced. Through spinal puncture every drop of spinal fluid should be slowly removed. The procedure will often need to be repeated, perhaps more than once. The canal refills at once from the ventricles of the brain, and does not cease refilling until the circulatory hypertension is relieved. I have frequently seen a uremic coma or hemiplegia or both relieved very shortly after spinal puncture. On more than one occasion the patient has given evidence of power in a paralyzed member before the fluid has ceased flowing. There is no more certain method of relieving the epileptiform convulsions of uremic hypertension and pressure. Sweating in these cases does good if secured by means of pilocarpin or some similar means, such as hot lemonade or other hot drink. I have gradually had forced on me the belief that the sweating obtained through the hot pack, or the steam bath, does not compensate for the increase of tension caused by these

procedures. Even diaphoretics should be avoided when the skin is hot and devoid of moisture. Nitroglycerin, sodium nitrite, and potassium nitrate may all be employed so long as the heart is strong. Their action in dilating the vessels will aid greatly in removing peripheral resistance in the circulation. Aconite in full doses is a still more effective vasodilator, but requires careful attention to the patient on the part of the nurse. Aconite is an almost perfect physiologic offset for the adrenalin-like toxins circulating in the tissues, and is the ideal antidote up to the point of contraindication on the score of cardiac distress. When the signal comes to stop its use there must be no delay, or all the good the drug has accomplished will be buried in the grave.

Hot normal sodium bicarbonate solutions in the form of enemas have seemed to me extremely beneficial in uremic cases, not only in providing diuresis and flushing of the kidneys, but in controlling the effects of the uremic toxins upon the central nervous system. Given very slowly, by the drop method, a considerable amount of alkaline solution will be absorbed during the hours of the day. The hours of night time should be reserved for complete rest. Morphine can be used to control delirium, convulsions, and restlessness and to promote sleep, which is essential if the patient is to recover. Like aconite, morphine seems to exert a natural antidotal action against the active toxins at work in the body. I never use opium in any form in a case of nephritis, however, without recalling a patient with erythema multiforme, studied during my experience as a hospital interne. She was swathed in bandages wet with leadwater and laudanum solution. As a result I was summoned to her bedside in the early hours of the morning to find her respirations 4 to 6 per minute, and to record her death a little later. She had been recognized as a case of nephritis, but no one had apprehended such a ready absorption of and sensitiveness to the drug.

Very seldom has morphine been found necessary in my experience after the intravascular and intracerebral tension has been lowered by the means already suggested. Usually quiet sleep has followed promptly without the use of drugs. Food

should be altogether withheld during the active uremic symptoms, and at least until the bowel has been swept clean. The appetite asserts itself once the toxemia is relieved, and until that time the foodstuffs that might be introduced into the stomach and intestine would only furnish a new supply of material for the manufacture of toxin.

The asthenic or low tension type of uremia calls for an entirely different handling. The temperature is low (often subnormal) the heart is weak, and all the vital forces are reduced to a minimum. Bleeding, purging, and spinal puncture will kill the patient. Cardiac depressants and vasodilator drugs will have an influence very similar. The hot pack may now become a life-saving institution. Also hot normal salt solution introduced into the bowel will stimulate the vital forces and assist in raising the tone of the circulatory system. Pituitary extract in some instances will accomplish a brilliant result.

Cardiac stimulants (neither alcohol nor nitroglycerin, which are both cardiac depressants), especially atropin in combination with digitalis, caffein, and spartein (the latter in one-quarter and one-half grain doses), may energize the weak heart muscle to the point of restoring, at least partially, compensation. The outlook in these asthenic cases is, however, not good, and too much should not be expected from even a prompt and intelligent treatment. The foregoing has had reference only to the so-called acute uremic attack.

Chronic Uremia. There is also present, not infrequently in cases of chronic interstitial nephritis, a condition that is perhaps best described as chronic uremia or chronic uremic toxemia. In such individuals there is absorbed almost constantly just enough of an excess of toxin to produce symptoms. Marked drowsiness after meals, a decided increase in an already high intravascular tension following either the ingestion of food or the most moderate exercise, grumbling headache, frequently a tendency to flushing of the face, and oftentimes numbness and tingling with motor embarrassment of some member (arm or leg), or even of one-half of the body—these are the signs, one or all of

which may indicate the fact that the patient is walking along the edge of the precipice of an acute uremic attack. They may continue indefinitely or they may usher in with slight warning an attack of coma, a hemiplegia, or a convulsive seizure.

Chronic uremia once it is recognized, calls for prompt and systematic treatment along the lines indicated in the discussion of chronic interstitial nephritis. Especially must the food supply be scrutinized, both in the matter of quantity and kind. Probably a safe experiment will consist in the use of a strict carbohydrate dietary for the time. Intravascular tension should be brought to an approximation of the normal range that will rid the patient of untoward symptoms by any or all the measures we have suggested. An occasional spinal puncture will prove one of the most gratifying measures in terms of the response of the patient to the relief from intracranial and intraspinal pressure.

Under these circumstances also it is advisable to place the patient in bed for a few days. He can then be started forward anew, with the disappearance of the evident signs of toxemia. The benefit of the complete rest is not only to the kidneys, but to the heart, the liver, the gastro-intestinal tract, and to the nervous system. I have been accustomed in private practice to encourage a patient with chronic uremia, providing the intravascular tension is not so high as to contraindicate the procedure, at intervals to indulge in a Turkish bath, once weekly, for several weeks. Or, better still, and even more effective in stimulating all the excretory tissues of the body, especially the skin, is the hot air or steam cabinet, which can be used for five to fifteen minutes at the bedside before retiring. No two patients will gain the same benefit from identical measures. Some of those mentioned will, however, be found to suit every individual case. The object is not, after all, to see how much we can do for a given patient, but to determine exactly that measure or two that will produce the desired result.

In the foregoing discussion of the treatment of nephritis I have not attempted to repeat every suggestion that has been made from one quarter and another. I have not dealt with cardiorenal disease as such, nor with the kidney of pregnancy, though the

general lines of treatment of both of these conditions have been amply covered in my general discussion. I have simply tried to offer in a concise and useful way the measures and means that have served me personally in the handling of true nephritis in the hospital and without.

I have not mentioned serotherapy, even though Dominguęz[1] states that Teissier's method of injecting subcutaneously the serum from the renal vein of the goat "has passed beyond the experimental stage." Teissier's original claim[2] was simply that the venous blood issuing from a glandular organ must contain the internal secretion of that organ in quantity. He attributes its efficiency to its action upon the liver and other glands.

Nor have I mentioned the renal lavage that has been so highly endorsed in certain cases of pyelonephritis.

Among surgical measures passing reference has been made to the temporary advantage, often well worth while, gained from capsule splitting and from decapsulation with omental investment. The object of the latter precedure is of course the establishment of a new and more ample blood supply to the kidney. Probably Dunn's[3] report of a case of anuria of 114 hours' duration in acute congestive nephritis is the most striking example of the benefit occasionally to be derived from decapsulation of both kidneys. Urination commenced in this case four hours subsequent to the operation, and 173 ounces were passed during the first twenty-four hours. No anesthetic was used, the patient being in a deep coma.[4]

I have intentionally dwelt very lightly upon drug treatment, not because medicinal measures are not of avail, but because they form the least important element in the management of the case. It is well to remember in this day of hydriodic acid and so many other iodine preparations, that all of the iodine derivatives are irritating to the kidney tissues and very difficult for them to eliminate, even when in a healthy state.

[1] Rev. de Med. y. Cirngia, Havana, December 25, 1912.
[2] Bull. de l'Acad. de Méd., October 6, 1908.
[3] Jour. Amer. Med. Assoc., February 17, 1912.
[4] The patient had been catheterized. The blood pressure was 180 mm.

I have omitted up to now the suggestion of a possible substitution of one kidney from a healthy man for the useless kidney in another, or even the substitution of the kidney from a recently dead cadaver. This experiment has repeatedly been tried in healthy animals with healthy substituted kidneys, and with altogether successful outcome. An exchange has been made, as is well known, of the kidneys of animals of different species (cat and dog). In communicating with Carrel, of the Rockefeller Institute with a view to an actual attempt of a similar kind upon an otherwise hopeless patient of my own, I found that even such an intrepid experimentalist did not feel justified in trying out the theory upon a man or woman in whom the new sound kidney must act in association and under the influence of a diseased organ on the other side. The probabilities seemed too likely of a prompt parenchymatous degeneration of the grafted kidney. Isobe[1] has shown by experimental study that when one kidney is diseased, the epithelium of its healthy mate suffers in the elimination either of the diseased kidney's products or of the toxins which it should and does not excrete. It is my own thought, however, that when first can be found a patient with absolutely no prospect other than that of the speedy death of a nephritic, who is willing to venture the experiment of having two healthy kidneys substituted for his own diseased organs, barely enough of an interval being left before the transplanting of the second organ for the first substitute to begin to functionate—that then the likelihood of degeneration will be reduced to a minimum, and we may at last be able to speak of a real cure for nephritis. In any event, the object is worthy of the attaining. Those who have helplessly watched many nephritics die, as one is compelled to every year in a large public hospital, realize what a Godsend to humanity such a cure would be. Unless some other investigator precedes me in this field I shall look forward with keen interest to a future report upon animal experiments of this nature, and who knows but that we may find the conditions all favorable to a similar advance in the form of a similar study upon some willing and

[1] Mitteil. a. d. Grenzgeb. Med. u. Chir., 1913, xxvi.

eager human being, who would prefer to die unless the chance be afforded to live in a different state of health.

The whole subject of the treatment of nephritis may have to be dealt with in the near future in a new and very different manner.

Our gradual enlightenment as to the accumulation of organic nitrogenous toxins (residual nitrogen) in the blood is forcing an entirely new understanding of the origin and causation of the various processes that play a part in the different types of nephritis.

No method promises so much of hope to the nephritic, however, as that of furnishing an entirely new and healthy renal mechanism. May the day speed its coming in which this old and crying need may be finally bridged over by the most brilliant surgical achievement of all time!

DISCUSSION

Dr. James Tyson: After a somewhat prolonged period of quiescence the subject of renal disease has of late years attracted a good deal more attention and quite a number of papers have come before us in the last two years, more particularly in the line of diagnosis or of increasing accuracy of our knowledge of certain conditions with the view to determining treatment. Dr. Willson has stated about correctly, so far as my observation goes, the principles of treatment at the present time. There has been nothing in the nature of specific treatment in that remedies are directed to the kidney lesion itself. Treatment is a matter of rest, suitable diet, relief of function and transference of it to some other organ thus giving nature a chance, by coöperating with her. It has been claimed that considerable precision has been reached in the determination of functional sufficiency and I think this is so. The only direct application of a special measure which occurs to me as having been brought forward is decapsulation, which I think does tend to free the kidney of conditions which prevent its recovery. The removal of tension thus secured, allows expansion, interference with which constitutes one of the obstacles of cure. While the results of this treatment are not what has been claimed by Edebohls, they have convinced me

that operation should be done more frequently than has been the rule. A complete cure has never occurred under my observation. On the other hand, the patient has assumed the appearance and condition of good health notwithstanding the fact that some albuminuria remains. The treatment advocated by Fisher of the application of solutions of sodium chloride and sodium corbonate to the kidney cells through the circulation by the introduction by the bowel of large quantities of alkaline saline solutions has not been well received. His book is a very fascinating one which will well repay the reader for the time given to it.

Dr. Willson, closing: I would add just a word. I desire to call attention again to the importance of the influence of the food quantity in the production of nephritis, especially of the chronic interstitial or fibrosclerotic type. It is an unpopular doctrine, but a very true one, that most people eat too much; and that in the twenty-four hours there is sufficient food ingested by the average individual to raise and maintain the tension of the blood current far above the normal point. The more I study cases of nephritis and of renal arteriosclerosis, the more confident am I that the most active influence in the production of the latter condition is a constant oversupply of food, day in and day out. If one may arrive at a common conclusion upon this point I think we shall then for the first time have secured an explanation of the great majority of instances of the sclerotic type of so-called nephritis.

THE DEVELOPMENT OF THE NASAL ACCESSORY SINUSES IN MAN[1]

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Mr. President and Fellows of the College of Physicians:

I wish to express my grateful appreciation of the compliment of your invitation to present before this honorable body something of my work during the past year as Corinna Borden Keen Research Fellow of Jefferson Medical College.

In the time allotted I can at best give here only a brief synopsis, but a complete report of the work will soon be published by the W. B. Saunders Company in the form of a monograph, copies of which will be placed in the College Library, where those interested in the study of the nasal accessory sinuses in man will find the observations detailed. At present we shall summarize statements and avoid statistics as much as possible.

The literature concerning the embryology, later development, and adult anatomy of the nasal accessory sinuses is rather abundant, yet the differences in the views expressed—especially concerning the extent of development during the years of childhood—seemed sufficiently great to warrant further study. Deductions drawn from a few observations are open to fallacy, owing to variations in the extent and type of development as found in different specimens of approximately the same age. Thus, in this series, an endeavor has been made to obtain a sufficient number of

[1] A synopsis read before the College of Physicians of Philadelphia, April 2, 1913. This paper was illustrated by thirty-six lantern slides made from selected drawings, which are being used in illustrating the complete published report.

cases showing the various stages of development to make the general averages of practical value in supplying information regarding some few points with which we have been imperfectly acquainted, on account of the scarcity of specimens showing the conditions present during the years of childhood.

The bodies of children between the ages of two and sixteen years being seldom obtainable in the dissecting-rooms of European as well as American institutions, it was necessary, in order to complete such a series, to develop a technique by which the accessory sinus areas could be removed *en masse* at time of postmortem examinations and still allow reconstruction of the face without marked disfigurement.

Ninety-six of the cases in this series (illustrations from several of which will be shown by lantern slides) were thus obtained from the postmortem-room of Friedrickshain Krankenhaus, Berlin, for which privilege I am indebted to Professor Ludwig Pick.

The other anatomical material was furnished by the Daniel Baugh Institute of Anatomy, and for the laboratory facilities and valuable suggestions I thank Professor Spitzka and Doctors Radasch and Dehoney.

The specimens studied were as follows:

(*a*) Serial sections for microscopic study of the nasal areas of 14 embryos and fetuses, aged from sixty to one hundred and thirty-three days.

(*b*) Macroscopic sections of 8 fetuses, aged from one hundred and thirty-seven to two hundred and forty-six days.

(*c*) Four full-term fetuses.

(*d*) Sagittal, coronal, and horizontal sections of the nasal and accessory sinus areas of 101 post-natal heads, which form an uninterrupted series, showing the stages of development from birth to maturity—the mucosa in each case remaining intact.

(*e*) Sections in the various planes of 18 adult skulls, the soft parts having been removed by maceration. The accessory sinus areas in these cases were filled with paraffin before sectioning with a thin saw—thus avoiding fractures of the delicate bones in the ethmoid area.

EMBRYOLOGICAL CONSIDERATIONS

The development of the nasal areas earlier than the sixtieth day of embryonal life will be considered only as a summary expressing the consensus of opinions held by embryological observers. Statements regarding the development later than the sixtieth day of embryonal life are based upon conditions as shown in this series, unless otherwise stated.

During the third week of embryonal life, there is evidence of beginning development of the nasal areas as shown by increasing thickness of the ectoderm on the anterolateral portions of the forebrain. At the end of the third or during the fourth week, the nasal area appears as a depression which is brought about by the increased thickness of the surrounding mesenchyme.

In the mesenchyme investing the anterior portion of the notochord is the first appearance of the primordial cranium. The primitive nasal capsule develops as a part of the primordial cranium, and from the portion extending forward beyond the anterior portion of the notochord, there is a core formed for the frontonasal process.

As the processus globularis on the lateral portion of the median nasal process approximates the lateral nasal and maxillary proprocesses, there is a deepening of the primitive nasal fossæ and a change in their shape from pyriform to oval. The ectoderm intervening between the approximated processes is resorbed, allowing them to become united by mesoderm which forms the floor of the primitive anterior nares. Posteriorly the membranæ buccoнasales persists until the twenty-eighth to the fortieth day, and by their resorption the primitive choanæ are formed.

The palatal ridges appear on the medial sides of the maxillary processes from the forty-fifth to forty-eighth day of embryonal life (J. P. Schaeffer), and by their approximation the palate is formed.

Schaeffer found the conchanasalis inferior appearing in embryos of thirty-eight to forty days as a bulging on the inferior portion of the lateral nasal wall immediately superior to the portion from which the palatal processes develop. From the fortieth to the

forty-third day, the ethmoidal fold appears superior and slightly dorsal to the fold representing the concha inferior.

Coming now to the conditions shown in the sixty-day embryo, we find the cartilaginous development in the nasal capsule well advanced. The anterior nares are filled with masses of epithelial cells, forming plugs which persist in some specimens up to the one hundred and fifteenth day.

As the nasal cavity increases in its supero-inferior diameter, the ethmoidal fold undergoes subdivision into the conchæ ethmoidales. Sixty-day embryos show two ethmoidal conchæ—the concha media and the concha superior. The conchæ in their early stages of development do not contain cartilage but are folds of mesenchyme, the central portions of which later become condensed and then transformed into cartilage. Such transformation in the sixty-day embryo is seen in the concha inferior and media, but the concha superior is purely a fold of mesenchyme covered by nasal epithelium.

The sixty-day fetus also shows on the anterosuperior portion of the lateral nasal wall, just anterior to the ethmoidal fold, a smaller prominence representing the early formation of the agger nasi or nasoturbinal. From the posterior portion of the agger nasi, there is seen in the sixty-five day embryo a ridge of mesenchyme extending in a postero-inferior direction along the superior curved border of the concha inferior, which represents the early processus uncinatus. The agger nasi with the processus uncinatus together form the "Erste Hauptmuschel" of Killian. Although comparative anatomists regard these structures as the homologue of the inferior olfactory concha as found in lower mammalia, yet the form and position which they have assumed in the human type is such that we deem it best not to consider them as forming one of the true nasal conchæ.

Shortly after the appearance of the processus uncinatus, there develops from the lateral nasal wall, just inferior to the attachment of the middle portion of the concha media, a projecting fold, which is the early bulla ethmoidalis. Between the free antero-inferior surface of the bulla and the posterosuperior surface of the

processus uncinatus, is a narrow interval—the hiatus semilunaris, the point of communication between the meatus medius and the infundibulum ethmoidale. By the development of these folds the lateral wall of the meatus medius becomes more complicated, and, by their variations in form and type of development, give rise to differences in the locations of the ostia of the anterior ethmoidal cells and exert an influence on the area from which the frontal sinus will develop. The bulla ethmoidalis in some instances appears as a smooth bulging fold in which the cartliage, developing as an extension from the lateral nasal capsule, is evenly rounded in outline. In the majority of cases, however, there is either a deep groove in the developing cartilage, or else two or even three separate projections of cartilage from the nasal capsule. In the latter method of development, the postnatal bulla may show a depression along its middle portion sufficiently deep to cause a slight groove in the overlying mucosa, but in no instance was a bullar cell found which had its ostium in such a furrow.

All ethmoidal cells, the frontal and the maxillary sinuses have their origin from preformed furrows in the ethmoidal area. The number of ethmoidal conchæ, into which the lateral ethmoidal mass becomes differentiated, varies from three to five. The majority of fetuses examined had three ethmoidal conchæ, four were not uncommonly present, and on one side of one specimen five ethmoidal conchæ were demonstrable. Killian would count such a specimen as having six ethmoidal conchæ, since he counts the agger nasi plus the processus uncinatus as the first ethmoidal concha—"Erste Hauptmuschel"—and regards such a condition as showing the number of conchæ possessed at some stage in early fetal life by all ethmoidal areas. He concluded that specimens showing fewer conchæ do so because of the fusing together of two or more of the primitive ethmoidal folds. However, since his own large series of fetuses showed only two specimens in which so many conchæ were distinctly differentiated, and since such specimens are so very seldom found by other observers of embryological and fetal conditions, it seems more probable that the number

found in any given case depends more upon the extent to which differentiation was carried than it does upon the fusing of conchæ already formed. In my own series, the 202 postnatal lateral nasal walls having mucosa attached show four conchæ nasales in 2 per cent. of cases, three in 92 per cent. and two in only 6 per cent. Yet two is the number described in most text-books on anatomy.

Beneath each concha is a corresponding meatus from which, or from its secondary furrows, processes of pneumatization may extend into the lateral ethmoidal mass and form cellulæ ethmoidales. These processes at first are such that the epithelial surfaces of the mucosa which advances as a cylindrical process, are in contact. Later they become hollowed out to form cells or sinuses.

The primitive invaginations of the mucosa are usually demonstrable during the fourth month, and actual cell formation is seen in specimens from the seventh and eighth months of fetal life. At time of birth, the anterior group of cells is relatively more advanced in development than the posterior.

Primarily, ethmoid cells are most satisfactorily divided into anterior and posterior, rather than into anterior, middle and posterior, according to the location of their ostia. All cells having their ostia inferior to the concha media are termed anterior ones, those with ostia superior to the concha media are posterior ones—this classification holding good, regardless of how far the deeper portion of any individual cell may invade the region ordinarily occupied by cells of the other group. These two groups are further subdivided as follows:

Cellulæ ethmoidales anterior	Cellulæ frontales. Cellulæ infundibulares. Cellulæ bullæ ethmoidales.
Cellulæ ethmoidales posterior	Cells communicating with the meatus superior. Cells communicating with the meatus supremus I. Cells communicating with the meatus supremus II.

Frontal cells develop from furrows between the conchæ frontales and the surrounding structures. These conchæ are demonstrable

in the majority of cases during the latter months of fetal life and in many postnatal specimens—especially in young individuals. They are situated on the anterolateral wall of the recessus frontalis, beneath the anterosuperior attachment of the concha media, and medial to the processus uncinatus. Killian regards the development of these conchæ as complete when three are present. Few specimens show the complete type, however, the majority having two such conchæ, others only one and not uncommonly none is demonstrable. These cells play an important part in the development of the frontal sinus—59.4 per cent. of frontal sinuses having their origin from this area.

Infundibular cells develop as invaginations from the anterior portion of the infundibulum ethmoidale. These cells also have important relation to the development of the frontal sinus, 24 per cent. of frontal sinuses having their origin from such cells. The manner in which the processus uncinatus is attached to the agger nasi, its relation to the bulla ethmoidalis and the type of attachment of the anterior portion of the concha media, exert the greatest influence upon the proportion between frontal and infundibular cells. If the processus uncinatus is attached to the posterolateral portion of the agger nasi and the concha media is attached high up on the lateral nasal wall, then the frontal cells are apt to be well developed. However, if the anterior end of the processus uncinatus is more medial in position and the attachment of concha media is lower on the nasal wall, then the recess is small, frontal cells are few or absent, and there is usually a corresponding increase in the development of infundibular cells.

The ostia of 81.7 per cent. of bullar cells were found to be in the suprabullar furrow and 18.3 per cent. in the infrabullar furrow. These cells vary from one to four in number—the percentage being as follows: One bullar cell was present in 25 per cent. of cases, two cells in 62 per cent., three cells in 10 per cent., and four cells in 3 per cent. of cases. Whatever the number of cells, the pneumatization always extends from the medial wall of the bulla to the lamina papyracea of the ethmoid, and often for variable distances into the supra-orbital plate of the frontal bone, and to a less

extent into the infra-orbital plate of the maxilla. The bullar fold is usually a well-rounded one, but in some few cases it is a narrow projection.

CELLULÆ ETHMOIDALES POSTERIOR

The posterior ethmoidal cells vary from one to five, the general average in 202 lateral nasal walls being 2.62. The percentage of cells from each meatus was found to be:

From meatus superior	81.1 per cent.
From meatus supremus I	18.4 per cent.
From meatus supremus II	0.5 per cent.

The ostia of the cells vary from oval openings 0.5 to 3 millimeters in diameter to slit-like openings from 3 to 14 mm. long and 1 to 3 mm. wide.

Seydel wrote that an ethmoid cell, having its origin from any meatus, did not communicate with any cell from any other meatus. Zuckerkandl took exception to this statement, but certainly every specimen in this series supports Seydel's view.

Posterior cells may extend into the supra-orbital plate of the frontal bone, into the orbital process of the palate bone, into the infra-orbital plate of the maxilla, or may in rare instances, even invade the body of the maxilla, forming, when the development is extensive, what has been termed a double maxillary sinus. The most posterior cell sometimes develops dorsally until a portion of it lies superior to the anterior portion of the sphenoidal sinus, but in no case was there communication with the sphenoidal sinus.

Protrusions from cells in the superior meatus may extend into the concha media, or from the meatus supremus I into the concha superior, thus forming conchal cells. Such cells may also develop into the concha media from the posterior extremity of the supra-bullar furrow.

THE SINUS MAXILLARIS

The maxillary sinus is the most constant of the accessory sinuses, both as to manner and extent of development.

In an embryo eighty-five days old there is an invagination of the mucosa in the inferolateral portion of the wall of the infundibulum ethmoidale—slightly anterior to its mid-point anteroposteriorly. Schaeffer found this lateral pouching beginning in some cases as early as the seventieth day. The lateral development gradually increases, first into the lateral nasal capsule, and then into the maxilla. As it extends into the maxilla, a medial wall is developed, and it becomes in the sixth or seventh fetal month an oblong sinus. In a child eight days old the sinus diameters were 3.3 mm. vertically, 2.8 mm. laterally, and 8.2 mm. anteroposteriorly.

The developing teeth are at this time closely approximated to the orbital floor; thus the early increase in the size of the sinus is most rapid in the anteroposterior diameter. As the body of the maxilla increases its size in the vertical direction, there is a corresponding increase in the lateral and vertical diameters of the sinus cavity. The sinus diameters steadily increase at a rate, which, up until the eighth year, averages approximately 2 mm. each year in both vertical and lateral diameters and 3 mm. anteroposteriorly. After the eighth year, development proceeds more slowly and reaches in the fifteenth to eighteenth year a form which is the adult type, excepting that the postero-inferior angle descends as the third molar tooth erupts.

The floor of the sinus in the average case reaches the same level as that of the floor of the nasal fossa during the eighth year, and, in the majority of cases thereafter is from 1 mm. to 5.5 mm. below the level of the nasal floor.

The ostium maxillare accessorium is an opening in the medial wall of the sinus maxillaris, which communicates with the middle meatus most frequently at a point 5 to 10 mm. above the superior border of the concha inferior near the junction of its middle and posterior thirds. The accessory ostium has no embryological significance. The youngest specimen showing such an opening was from a child four years, three months and two days old. The process of development is that of a progressive thinning of the medial wall of the sinus at a point where there is usually no

osseous lamina—the thinning continuing to such a degree that actual rupture occurs. The wall is naturally thin in this area, but in a great majority of cases the development of the accessory ostium appears to be due to a pathological process, whereby the vitality of the area is decreased. In 76 per cent. of cases showing accessory ostia there were mucous cysts in the mucosa lining the sinus cavity—the cysts varying from 0.5 to 11 mm. in diameter. In 19 per cent. the mucosa was granular in appearance, and in 5 per cent. the mucosa showed no evidence of pathological changes. The cases in this series strongly suggest that pulmonary tuberculosis exerts an influence upon the frequency of the occurrence of the ostia—however, the series is not large enough to establish it as a definite fact. Of 114 lateral nasal walls from cases between four and twenty-two years, 15 per cent. show accessory ostia. Of the 114 specimens, 42 per cent. were from patients who had died from tuberculosis. Of these specimens from tuberculous cases, 37.5 per cent. had accessory ostia, while those from all other diseases had accessory ostia in only 7.7 per cent. of cases.

THE SINUS SPHENOIDALIS

The sphenoidal sinus does not develop from a preformed furrow, as do all other air sinuses communicating with the nasal cavities, but develops as an extension from the most posterior portion of the spheno-ethmoidal recess.

The beginning of the sphenoidal sinus is shown in sixty-day embryos as an invagination of the mucosa, which, as it develops, extends into the posterior portion of the cartilaginous nasal capsule in a postero-inferior and slightly lateral direction. As it increases in size, it soon comes into relation with the antero-lateral portion of the body of the sphenoid bone. In the portion of the nasal capsule which forms the anterior wall of the primitive sinus sphenoidalis, there develops an ossification centre from which is formed the concha sphenoidalis or ossiculum Bertini. Ossification is in some cases well advanced at time of birth.

The rate of development of the sinus sphenoidalis has been universally underestimated. Most writers either quote the observations of Toldt, or else make slight modifications of his statement, that the resorption process is noticeable in the third year, reaches the sphenoid bone in the sixth or seventh year, and in the eighth to tenth years really becomes a cavity in the sphenoid bone. We find, however, that during the first year, there is extension along the anterolateral portion of body of the sphenoid bone—at which time the sinuses are separated by a septum 8 mm. thick. In the second year the average specimen shows distinct invasion of the sinus into the sphenoid bone, with its greatest increase in the posterolateral direction, where the deepest portion may be within 2 mm. of the foramen rotundum. Development increases by resorption of the body of the sphenoid at a rate, which, in the average case of eight years, shows the sinus extending beneath the hypophysis and the septum narrowed to a thickness of about 1 mm.

These averages of extent of development are of practical importance, whether one is dealing with inflammatory processes, neuralgias due to sphenoidal sinusitis (as pointed out by Professor Sluder), or in operations upon the hypophysis. Recesses from the sphenoidal sinuses may develop into the pterygoid process, the greater or lesser wing of the sphenoid, the orbital process of the palate bone, or far into the clivus. The extent of pneumatization in any given specimen bears no constant relationship to that of the other accessory sinuses in the same specimen, nor is there any definite proportion between the size of the sinus and the form of the nasopharynx.

THE SINUS FRONTALIS

The areas from which the frontal sinuses may have their origin were described when considering the frontal and infundibular cells.

Killian states that the frontal sinus may develop in the following ways:

1. Extension of the recessus frontalis.
2. Extension of a frontal cell.
3. Extension of the recessus frontalis and a frontal cell.
4. Extension of two frontal cells.

In the study of this series of 202 postnatal frontal sinus areas having mucosa attached, we have modified Killian's classification of origin. The classification used and the percentage of each variety is as follows:

(*a*) Extension of the recess or of a cell in the recess beneath the anterior attachment of the concha media and medial to the anterior attachment of the processus uncinatus, 59.4 per cent.

(*b*) Direct extension of the infundibulum ethmoidale, 15.6 per cent.

(*c*) Extension of a cell having its origin from the infundibulum ethmoidale, 24 per cent.

(*d*) Extension of a cell having its origin from the suprabullar furrow, 1 per cent.

(*e*) Supernumerary sinus frontales.

In 101 cases (202 frontal areas), two showed the presence of two distinct frontal sinuses on each side, and three cases showed two sinuses on one side and one on the other.

In the seven double sinuses the origins were found to be as follows:

1. From two cells medial to the processus uncinatus in three instances.
2. From two infundibular cells in two instances.
3. From an infundibular cell and direct extension of the infundibulum in one instance.
4. From direct extension of the infundibulum and extension of a cell medial to the processus uncinatus in one instance.

While there are indications of expansion both of the anterior portion of the infundibulum and of the recess medial to the processus uncinatus during the latter months of fetal life, yet in the average case one can not say definitely, which extension represents the primitive sinus frontalis until after the sixth month of postnatal life. In some specimens the probable route of development

can be determined wth a fair degree of accuracy shortly after birth, while in others the distinct beginning of a sinus frontalis is not demonstrable until near the end of the first year.

From whichever source a frontal sinus may have its origin, the process of pneumatization gradually extends from the anterior ethmoid area toward the lower portion of the frontal bone; then the sinus surrounded as it is by a thin lamina of firm bone which forms an envelope for it, slowly invades the area in which there is diploë. As the sinus advances into the vertical portion of the frontal bone, its posterior wall is always thin and composed entirely of firm bone, while the anterior wall varies greatly in its thickness and usually contains an appreciable amount of diploë.

The level of the ostium of the sinus frontalis varies from 0.5 mm. above to 6 mm. below the level of the nasion. The diameters of the ostia vary from 1 mm. by 2 mm. to 10 mm. by 6 mm.

The rate of resorption of the diploë in the vertical portion of the frontal bone is seldom equal on the two sides, thus deviations of the septum frontalis are frequent, and the lateral extent of sinuses asymmetric. No case in which the interfrontal suture persists, shows the sinus of one side extending past the median line into the opposite side. In a small per cent. of other cases, however, the sinus from one side may invade the opposite side so far as to make the septum frontale form part of the anterior wall of the other imperfectly developed sinus, which remains an infantile type.

In the second year the sinus usually begins its ascent into the vertical portion of frontal bone, and in the third year the average height is 3.8 mm. above the level of the nasion. The vertical diameter steadily increases and the averages in the sixteenth year reach the average given by Miloslawski as that of a large series of adult skulls, viz., 23.7 mm. The prominence of the superciliary ridges bears no definite relation to the extent of the sinuses found beneath them. The average lateral diameter in adults is 25 mm. and the anteroposterior diameter 15 mm.; but in exceptional cases pneumatization may extend to the external angular process, also far into the supra-orbital plate and even posterolaterally to the parietal bone.

The incomplete septa often seen in the superior and the posterolateral angle are not due to partial resoprtion of what was once a complete septum or the result of duplicated ostia, but are the result of irregularities in the late resorption of diploë. Sinuses in children under eleven years of age show no such ridges.

The majority of the dissections forming the series upon which this paper is based will be permanently mounted and placed in the Museum of the Daniel Baugh Institute of Anatomy, where further studies will be made.

DISCUSSION

Dr. W. M. L. Coplin: Dr. Davis' conclusions and the beautiful illustrations which he presents seem to establish the possibility of transfrontal infection of the basal area of the brain at a very much earlier period than has been held to be likely or possible. One of the arguments against this method of intracranial infection has been the lateness at which the sinuses develop. The study made by Dr. Davis shows conclusively that we have been wrong in putting this development at so late a period.

Dr. Warren B. Davis, closing: The point brought out by Professor Coplin was illustrated in the lantern slides, showing the stages of development at the various ages. Coronal sections of an 85-day embryo showed the primitive sinus sphenoidalis beginning as an evagination of the mucosa in the extreme posterior portion of the naso-pharynx and sagittal sections of a 137-day fetus showed its distinct projection into the posterior nasal capsule. The primitive frontal sinus being present in the first year and showing distinct advance into the lower portion of frontal bone during the second year, the sinus maxillaris being at time of birth a distinct cavity and the ethmoidal cells being well formed in the eighth month of fetal life, all show the possibilities of early meningeal infections by these routes. Many cases in the series had died of nasal diphtheria, and I was struck by the fact that the diphtheritic membrane in practically all cases completely filled the ethmoidal cells and in many cases partially filled the frontal, sphenoidal, and maxillary sinuses.

PRINCIPLES OF SOCIAL SERVICE WORK AND THEIR APPLICATION IN PRACTICE AT THE STATE TUBERCULOSIS DISPENSARY, PHILADELPHIA[1]

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Anyone who has given the subject of Social Service Work sufficient attention to understand its aims must be increasingly impressed by its growing importance. What was a few years ago a somewhat idealistic effort to supplement in a limited way the medical service of hospitals, has today established itself as an essential and integral part of such service. It is indeed not only recognized as a necessary supplement to hospital work, but it bids fair to become ere long quite as important as the hospital work itself.

The reason for this is obvious, and lies in our clearer understanding of the factors in the social condition and life of the indigent, which are in large measure responsible for much of the sickness and distress to which poverty is heir. It lies in the appreciation of the fact that in treating the sick alone, we are in a large measure simply treating a symptom of an underlying social condition, a symptom directly due to bad housing conditions, bad hygiene, ignorance and poverty, and that if we are to apply the great principles of modern scientific and preventive medicine wisely and effectively, we must remedy and prevent the underlying causes of diseases, rather than rest satisfied in handling as best we may the ever-growing crop of such illness.

[1] Read April 2, 1913.

To carry this thought a little further, the principle of eugenics, one of the greatest problems of the age, is as Professor Moore of the University of Liverpool well puts it not the survival of the fittest, not an attempt to rear a race of men and women whose resistance is attuned to living and surviving in a germ-laden world, who are capable of withstanding an utterly vile and vicious environment. It consists rather in forming a pure, healthy, and happy environment, in making the world a fit place for all to live in, and in producing the noblest and ablest race both physically and mentally to inhabit that purified environment. The application of this to the question under discussion, for it applies directly to the environment of the poor, is evident, because it is the function of social service work to improve the environment of the poor and sick in the broadest sense.

My reason for wishing to illustrate my remarks by reference to the Social Service Work of the State Dispensary (No. 21) for Tuberculosis,[1] is because it applies in a specific and definite way the principles governing Social Work in general; because the Department of Health has the means and facilities to make it a most efficient and far-reaching service, and has, I believe, set a standard for such work; and because we welcome intelligent and constructive criticism and advice.

In this relation it will be necessary to speak in general terms about the duties and relations of the nurses, and this paper will concern itself principally with this phase of the subject.[2]

FOLLOWING UP DISCHARGED SANATORIUM PATIENTS

There are at present five nurses employed at Dispensary 21, two of whom give their whole time to following up the return cases from the State Sanatoria. Many of the cases sent by us to Mont

[1] There are three State tuberculosis despensaries in Philadelphia, with an aggregate of about 1000 cases under treatment a month: The Gray's Ferry State Dispensary, the Frankford State Dispensary, and the Philadelphia State Dispensary. They all follow the same principles as laid down in this paper.

[2] For an interesting and instructive exposition of some related activities of social service work among the tuberculous, consult the work of Dr. James Alexander Miller and his associates in connection with the tuberculosis clinics of the Bellevue and allied hospitals, latest reports.

Alto and Cresson, who were originally our patients, return for continued watching or treatment upon their discharge. A number, however, frequently because they consider themselves cured, do not do so. As soon as a case is discharged from the sanatorium that information, with other data as regards condition in discharge etc., is sent at once to us. At the end of a stated period, if that case has not returned, the nurse looks it up, and gets it to come in.

This has the advantage not only of enabling us to follow systematically, and I may say for years, these cases, but it enables us to take up afresh the constructive work of uplifting and prevention in the homes. As must be plain to every one, this can be done much more effectively after the patient's sanatorium experience than before. That is the most effective time to attempt the introduction of sanatorium methods in the home. The patient himself must by experience have lived and learned these methods before you can get him and through him his family to effectively carry them out.

The nurses make out detailed reports on all cases discharged from the sanatoria, at periods of six months, whether our own patients or not. These will be and are valuable for statistical data. Practically all the data for reports as to subsequent results in cases discharged from sanatoria which have so far appeared in this country at least, have been made up from information gleaned by writing the discharged patient and having him fill out his own report. It does not tax the imagination unduly to conclude which is the more accurate, the answers to questioning by a trained worker (we have selected for this work the two nurses who have been with us longest) who in addition takes the temperature, pulse, etc., herself, and usually succeeds in getting the patient back to the dispensary for at least one reëxamination; or such answers as a patient may see fit to make to a printed questionnaire. It is not in the least my purpose to cast any criticism whatsoever on the valuable reports which have been made following the latter method, but I spoke above of setting a standard in this work and that involves its obligations. As an index of the efficiency of this system, let me state the fact that of 443 patients from Philadel-

phia who were in 1909 discharged from Mont Alto, the only cases of whose condition today (within six months) we have not full records are 18 who are known to have left the city and so been lost sight of.

DISTRICTING THE CITY

For the purposes of the regular dispensary service and inspection work, the dispensary limits itself to receiving patients from certain districts of the city, though as a State institution it is impossible for the dispensary to refuse any case no matter where they live, if they insist upon treatment. Usually by a little persuasion, however, we can get cases to go to the dispensary in their district, *i. e.*, nearer their home. For instance, we refer all cases which apply from the district south of Market and east of Broad Streets to the Phipps Institute of the University of Pennsylvania; the Gray's Ferry State Dispensary covers the district west of Broad and south of Woodland Avenue; and we coöperate in the same way with the Kensington Tuberculosis Dispensary and the Frankford State Dispensary. The section of the city from which we draw our cases is divided for purposes of our inspection and Social Service Work into three districts, with a nurse assigned to each, and this gives each of our nurses roughly speaking about seventy-five patients a month to take care of. These patients must be visited regularly every two weeks, which gives each nurse at least one hundred and fifty visits a month to pay, not including the visits to new cases.[1]

THE NURSE'S DUTIES

Every new case which is admitted to the dispensary must be visited within one week of the day of admission. The nurses come in from their visiting work and report daily at 12.30 o'clock for one hour to the dispensary office, and the new cases according to the districts in which they live are assigned to the nurse having

[1] It need hardly be explained that often a nurse will have to spend much time and pay many visits in connection with a particular case, according to the social or medical needs.

charge of that district. The advantage of having the nurse report daily to the dispensary at a time when all the doctors are there, lies in the fact that the doctor has thus the opportunity of talking over with the nurse the new cases which she is to visit and to making any suggestions which he has gleaned from the history and examination of the patient. It is thus possible, too, for the nurses to visit the new cases in the afternoon of the same day. The advantage of this close coöperation between doctor and nurse must be at once apparent. Further, each nurse is required to report to every physician one morning a month with the histories in hand of all the patients of that particular doctor which are on her list. This is valuable because in no other way can the doctor get so thorough an understanding of the home conditions and social problems of a given patient as by talking the situation over directly and personally with the nurse in charge. The mere reading of her notes on the history sheet of the case (for she must, of course, write up each visit she pays) gives at best but a cursory idea of the home situation. This system has the further advantage that the doctor can see at once from the nurse's notes just how often his cases are being visited, and he further gets a very good idea of the capabilities of the different nurses from the manner in which they grasp and handle the social problems confronting them.

It follows also that it is thus a relatively simple, though somewhat onerous, task for the physician-in-charge by going over all the histories for the previous month to know just how well each nurse is keeping up with the number and time of her visits. This is regularly done, and the nurses kept up to their work in a systematic way. Nor is this in any sense unnecessary in dispensary work, as some plan must be followed to check up the work of the nurses, who are on the street all day and practically without supervision, except insofar as the doctors interest themselves in overlooking their work.[1]

[1] In the State work there are also a chief nurse and her assistant, with headquarters at Harrisburg, who go from one State dispensary to another (there are 115 State dispensaries), overlooking and instructing the nurses.

COÖPERATION BETWEEN PHYSICIAN AND NURSE.

This relation and coöperation between the dispensary physician and the dispensary nurse is of fundamental importance and can hardly be overemphasized. The nurse should be thoroughly familiar with what the doctor wishes and thinks about a given patient; and the doctor must be thoroughly familiar with the home conditions and the nurse's plans and efforts. This coöperation and interrelationship is essential, and the responsibility is mutual.

THE NURSES AND THE CHARITY ORGANIZATIONS

For sometime the practice was followed of permitting the clerk in the office to telephone directly to the Society for Organizing Charity or other agencies in regard to details of cases, which could be more expeditiously handled in this way; but it was found that this was not as effective a method as might appear on its face, because the nurse in charge did not always know what had been done through the office, nor was the office always fully informed of the plans of the nurse in a given case (with such a large service it was impossible that this should be so), so that this course gave rise to conflicting plans and frequent misunderstandings and was abandoned. Now the nurse is responsible for her own cases and all that concerns them, and if a hospital or society organization is to be communicated with, it is done directly by the nurse herself or only through the dispensary office at her request. Thus there is no feature or detail of a case with which the nurse in charge of the case is not familiar, and the active and responsible agent. Further, the nurses are directed to consult personally with the district superintendents of the Society for Organizing Charity of other agencies about the planning or needs of a case, in order that their results may be more effective and that by the personal exchange of information and ideas, they may themselves be better informed and more competent.

COÖPERATION OF CHARITABLE AGENCIES.

In regard to our work and its relation to the Society for Organizing Charity and similar agencies, there are, of course, no State funds which can be applied to financially assisting patients, paying their rent, buying food or clothes, or providing car fare to the State Sanatoria, nor is it wise that there should be; but as one or more of these is needed in practically every family we handle, it must be patent to every one the great part played by the charitable organizations of the city upon which we have to call so continuously and which respond so effectively and so unfailingly. This coöperation and supplementing by the private charitable organizations of the city is worthy of all praise, yet it is only just and right. If the State relieves private charity of the tremendous drain of medical care and treatment of these cases, it is only just that we should look for and expect this freely given response on the part of charitable organizations to our own unselfish efforts in behalf of the indigent sick. If this mutual coöperation is to be most effective, workers of the various organizations should understand each other's aims, should follow the same lines and methods, and should work shoulder to shoulder to achieve a common end. This I believe to be very efficiently done by these organizations in Philadelphia.

THE TRAINED NURSE *versus* THE SOCIAL WORKER

Apropos of this subject, the question presents itself of how a previous course of medical training affects social work. Is it advisable, speaking generally, that a social worker should be also a trained nurse? I should answer this by saying, only so far as all education and training tend to develop the character and ability of the individual. Certainly, in general, Social Service Work as done by the Society for Organizing Charity it is not necessary, nor even perhaps wise. Trained nursing and Social Service Work are today two distinct professions, though there is an evident interrelationship.

But in hospital work, where the element of sickness comes in, there is a different phase, and I imagine the tendency will continue to have trained nurses do this work. The experience and training of the nurse is admittedly a factor not only in her advice and supervision of the patient, but in her ability to detect signs of illness in other members of the family, and her knowledge of hygiene. It should be borne in mind, however, that general and simple rules of hygiene, or practically whatever special knowledge is required, may be readily acquired by any intelligent women; she does not have to spend three years in a hospital for this; and in emergencies a physician or the district doctor must be called in any way, so that the question presents itself whether the long and arduous training of the nurse is not out of proportion and unnecessary in view of the limited field social work offers for strictly medical experience.

Certainly the very first thing we have to impress upon our own Social Service Workers (who are all trained nurses) is to adopt the point of view of the social worker and submerge that of the trained nurse. They all begin by making notes which are filled with an account of the patient's appearance, strength, how he sleeps and eats, and whether his cough is better or worse; in other words, they approach the case from a medical point of view. This is not of great service to the physician; he can ask all those questions for himself when he sees the patient. What the physician wants is an intelligent account of the home conditions. Is his house clean? does he sleep alone? how many windows? how much air space? what are the financial resources of the family and the social needs? Then, most important of all, there is the duty of rearrangement, readjustment, in the home, all of which is purely a social problem, with only the indirect medical bearing. So the point cannot be too emphatically made, in my opinion, that the trained nurse must, to be effective in this work, adopt the point of view of the trained social worker. She must not consider herself a very superior person, not be too opinionative, because she is a graduate nurse, which I regret to say is sometimes the tendency. She must look upon her R. N. very much as a business man does on his A. B. if he happens to have one, *i. e.*, forget about it. If she is to succeed

and be useful, she must become a good social worker, and the fact that she has been a good trained nurse (except as an indication of character and intelligence) will not of itself be of any vital importance to her.

In this connection therefore I would conclude that Social Service should be made a part of the training of nurses, that they may intelligently understand it, and adapt themselves to its point of view; and it would also seem wise if the training of professional, social, or charity workers should include pretty thorough instruction in medical and school hygiene and a knowledge of the course and management of the diseases with which they are apt to come in contact.

FREE MILK DISTRIBUTION

The question as to whether a patient is to have milk sent to his home or not is left entirely with the nurse and no milk is ordered except upon the nurse's recommendation following her first visit. Nor is milk ordered routinely by the nurses, but only in those cases which are willing to respond to her views as to the improvement or changes necessary in their mode of life. In other words, the nurse begins at once to work on some definite problem which the particular home or family presents; there may be one, oftener there are many problems or phases of problems, and it is only as the patient responds in the effort to help himself that he receives milk. I believe in giving milk if only for the reason that with this as a club we have better control and can consequently get better results than we possibly could without it. Milk is not continued in a given case for a longer period than six months (we give one quart a day) except in exceptional cases where it is optional with the doctor to continue it longer. But we find that after we have once got the patient's confidence and that of his family, which this period of milk giving enables us to do through our careful work and supervision, the mere stopping of the milk does not in the majority of instances cause them to cease coming. Aside from the absolute need from a medical point of view for this increased nourishment, the above is a very important element in it,

and after the discontinuance of the milk for three or four months it is often renewed in those cases which have continued to come and seconded our efforts in their own behalf. I may say that it is particularly gratifying to note the way our patients stick; we get to know them intimately, and very many of them have been coming for years. And we are in relatively close touch with the great number who have returned to work and ceased their regular attendance at the dispensary. From a reasonably large experience in dispensary work of the best type elsewhere, I have never seen anything to approach this phase of our work.

THE RESPONSIBILITY OF PATIENTS

The social theory of this work is to help the patients to help themselves, to give them self-made opportunities for cure and improvement in their homes, and we continually impress upon them their side of the bargain, their responsibilities. When a patient will not go to Mont Alto or Cresson without good reason, will not sleep with his windows open, or take care of his sputum: in other words, when they prove recalcitrant and unteachable, we simply discharge them. Such cases are relatively few, and they have often returned to us after a short spell of being left to themselves, having learned their lesson in their own way and proved remarkably docile subsequently. We do not take this summary course in a hurry, we are long-suffering; but where we become convinced that the patient is making no effort to do his share, is not responding, we withdraw.

BRINGING IN THE PATIENT'S FAMILY

It is unnecessary and indeed impossible to go into the detailed features of the work of the nurses so complex is it in its many problems, but as an index of the thoroughness of their work, I will point out one phase of it. It is a well-recognized principle in tuberculosis work for the social worker to try to get other members of the patient's family to come to the dispensary for

examination. This is usually followed out with more or less consistency of purpose in most medical dispensaries, and I suppose that speaking generally it would be a very fair allowance to say that perhaps a case or two or a few cases are brought in from time to time by the nurses doing this work. We are not satisfied with this, but we insist that *every member* in the families of our patients must come in, and I am proud to say that I can show you case after case where we have never stopped until we get in for examination every single member of the family. We mark this on the face and at the top of our histories in red ink and the nurse's work in a given family, whatever else she may accomplish, is never considered completed or successful until she has got the entire family to the dispensary. In this way we are able to ferret out many incipient cases which are still in a curable stage. That this is a very important feature of this work can be readily understood when it is appreciated that the small wage-earner does not consult a doctor until his health is seriously impaired, long after the stage when he can be considered an incipient case, when his loss of weight growing weakness and cough have really forced him to this step. If you expect to have the incipient case walk into the dispensary you will be grievously disappointed. They don't come, they don't know they are sick, and their friends don't know it. It takes a knock on the head to make them understand. The same thing is true of the cases sent in by physicians, they are all moderately advanced or far advanced cases. The great majority of the patients sent to the State Sanatoria are second and third stage cases.

We hear a great deal about the problem of the advanced case. He must be cared for on his own account and on account of the danger to his family and the community. This is essential and is universally recognized. But it should be remembered that at one stage of his disease, which probably was of considerable duration in point of time, he was *curable*. I regret to say that during this time he has probably passed through the hands of some physician, often more than one. How are we to get our benevolent claws on these cases? There are only two ways: the one outlined

above, examine *all* the apparently well members in the families of your dispensary patients; and the second, teach and beg and instruct the general practitioner that he *must* turn over indigent or poor consumptives to those who can properly handle them, at a time when they can be most effectively handled. And in this connection do not forget the children. Children of tuberculous patients should be systematically watched over and even treated in the so-called pre-tuberculous stage.

THE STRICTLY MEDICAL *versus* THE SOCIAL POINT OF VIEW

In conclusion, I want briefly to speak about a broader phase of this work, which involves a confliction of interest, which is not only apparent but real, between the medical and social point of view in handling cases of tuberculosis, and I feel I must speak of it here because the sociological point of view is the correct one. This confliction of interest or of policy comes about from the failure on the part of physicians to appreciate one of the fundamental principles of tuberculosis dispensary work among the poor, which is first and foremost to get the case away to a sanatorium. This is necessary not only to give the patient the benefit of the cure, but also and quite as important for a preliminary course of education, training, and segregation. For obvious reasons one's instructions are infinitely better carried out by the patient and by his family *after* he has been to a sanatorium than *before*. It is infinitely easier to introduce (within reasonable limits) sanatorium methods in a patient's home after he has lived and learned those methods for himself, than by any amount of word-of-mouth teaching. But this is something which many physicians and dispensary workers have yet to appreciate, and so they persist in an attempt to treat the patient in his home from the beginning, which is not only unfair to him, but to his family, and in this process they distort the home relations and needs and in making them subservient to the sick man, divert or misapply the purpose of social work. Because if the medical point of view is strictly carried out, it must mean that the whole household is made subservient to the needs

of the sick member or members. In such a case there is a tremendous waste of charitable effort, for not only can little be accomplished in the last analysis for the sick man, but the whole family weighed down by this burden becomes dependent on charity. The function of social work among the tuberculous, as among other classes, is not strictly to treat the sick man and support his family, but to relieve the family of the burden of his sickness and make them self-supporting; to take care of him away from his family and to put him in such shape by sanatorium treatment, that he can finally play a part, however small, in the general maintenance or at least cease to be a burden and a menace pure and simple. In other words, it is the distinction between unwise help, help that handicaps and pauperizes; and the principle of raising the self-respect, maintaining the solvency, and lending a helping hand to elevate the whole standard of living in the family as a whole. No one can offer evidence to prove nor claim with a shadow of justice that, among the indigent, treatment at home can compare with sanatorium treatment, either as to results or prevention. Personally I believe this applies almost equally to the well-to-do. There is not one of us, I venture to say, whose first step if he developed tuberculosis, would not be to go to a sanatorium. While treatment in the home is not unproductive of results, it is gross self-delusion and unfair to patients to claim that home care can equal institutional care. "As long as tuberculosis is a communicable disease, so long will segregation, which is best achieved in hospitals and sanatoria, be the only logical protection for the community (Miller)." I emphasize this, because, strange as it may seem, are there not wanting those who vigorously combat this point of view? Every indigent case of tuberculosis in this State should be at once listed for a State sanatorium, since the splendid sanatorium facilities make its admission and care potentially possible, and the case treated and supervised until it gets away. But the real work of cure, prevention, coöperative help, and uplifting in the home, begins after his departure and upon his return, when the patient, and through him his family, may be most effectively handled and helped.

DISCUSSION

Dr. A. B. Hirsh: I rise mainly to express my appreciation of the reading of this paper and regret that a very much larger audience is not here to testify to its worth. I hope that in some way Dr. Francine will find a means of spreading these facts before the people of the State, as the problem is a sociologic one upon which the public needs much education. The writer has emphasized the relation between the social service of the State Dispensary and the Society for Organizing Charity. I have for years contended that the solution of this whole problem of overlapping of charitable work will be solved only through united effort between dispensaries and like institutions and an organization such as the Society for Organizing Charity. In the movement now on foot to lessen hospital dispensary charity abuse some such central body will unquestionably be used as a clearing house for the needed information.

Dr. James Tyson: Dr. Francine has undoubtedly struck the keynote when he insists that the successful treatment for tuberculosis must be in a sanatorium, and I confess to having been somewhat surprised at hearing that there are still those who take a different view. His claim seems perfectly clear, that from the standpoint of the family, the patient, and the communicability of the disease, we should insist upon sanatorium treatment in every case in which it is possible to institute it. I have been impressed also with the fact that the State has been able to carry out the dispensary treatment in the most satisfactory manner only by the aid of the Social Visitor. In my experience the dispensary treatment of tuberculosis is not as much a success as we would like to have it. I do not think it is a failure. I think it ought to be followed up whenever possible, and especially if possible with the aid of the social worker who can do more good in the home of the patient than the physician can in the dispensary. There must be, however, it seems to me from the statistical reports, a great many patients who cannot reach the sanatorium for different reasons. One reason is that there is not sufficient provision for everyone to be found. These cases must be treated by physicians and in dispensaries if they have any treatment at all.

Dr. H. R. M. Landis: Frankly, I wish the tuberculosis problem were as easily and readily solved as the dispensary treatment would seem to offer. As a matter of fact, our results in sanatoria have not been any too favorable. Not that there would not be excellent results if patients could be kept there long enough, but, unfortunately, the average stay in a sanatorium is not more than four months. The problem, therefore, comes back into the home. It is well recognized that treatment for from four to six months in the sanatorium is after all simply the pre-

liminary stage, and that if the patient does not continue the treatment in the home he will almost inevitably relapse. As a matter of fact, under the most favorable conditions about 50 per cent. do relapse. I agree that the problem is to some extent a social one. It is also a question of public sanitation. So long as there are slums and the bad housing conditions seen in all large cities, just so long will there be tuberculosis and other infectious diseases.

The last 100 consecutive cases that came to the Phipps we investigated thoroughly from the standpoint of whether we had to deal with a purely sociological problem, with a medical problem, or both. 70 per cent. lived in houses utterly unfit to live in. Nearly 60 per cent. had practically no idea of personal hygiene. The question of immigration is a large factor. In these 100 consecutive cases no less than 70 per cent. were foreign born and were for the most part untaught as to matters of hygiene. Even were they put into desirable houses they would not know how to live. Even with the bad housing conditions we must realize that it is the people who make the slums, to a large extent. We must have sanatoria, dispensaries, and hospitals for advanced cases to take care of the present crop of the disease, but they will always be necessary unless the underlying conditions are changed. The matter is one for physicians rather than social workers.

Dr. C. L. Minor, Asheville: This is a subject which interests me, not so much as a doctor but as a citizen, and I have for a number of years when speaking upon the question dwelt upon the fact that the matter, as I believe, is one for the statesman, the sociologists, and for the police as much and more than for the doctor. The chief reason that the sanatorium fails—insofar as it does fail—is that it is essentially a training school, and that in all schools there are some pupils who cannot, or will not, be taught. Those who come from the vicious poor of our slums do not want to be taught, they prefer to be dirty and unhygienic. They return from the sanatorium and live as before. That is the class that makes it practically impossible for the sanatorium to accomplish much. I wish I could suggest a solution to so difficult a problem. I am satisfied that it is a question of police control, though we realize that our police have a long way to go before such an ideal condition may be realized. I am not speaking of the advanced case. We can take the advanced cases into the hospital and keep the patient there until he dies. We can take the intelligent poor into sanatoria and teach him, but what we are to do with the slum class, gentlemen, I do not know, unless we forcibly detain them in proper institutions.

Dr. Francine, closing: I think Dr. Hirsh makes a very good point in relation to the question of dispensary abuse. It seems to me that Social Service work offers the solution of that problem. For as dis-

pensaries and hospitals develop and systematize this branch of their service, it will inevitably follow that the Social Workers by knowledge of the home surroundings and financial resources of patients, will be in a position to check this form of abuse. At the State dispensaries we have a card which patients must sign before they can be admitted, which avers that they are indigent and unable to pay for medical attention. Then a written statement is taken of the family income, rent, sick benefits, insurance, and number to support, and this statement is confirmed by the nurse within one week and before the patient's second visit. There has not seemed manifest a desire to evade these regulations or to make false statements. It occasionally happens that an applicant for treatment on reading the card and understanding the nature of the inquiry, frankly admits that they were under a misunderstanding and can pay a doctor. Such cases are referred back to their own physician. The average income of our families is about $45 a month and the rent $15 for four people.

Everyone agrees with the broad point of view taken by Drs. Minor and Landis. The fundamental and ultimate field of prevention lies in improving housing conditions and domestic hygiene among the poor. Tuberculosis is largely synonymous with poverty and ignorance. In recognizing this, however, we are not relieved of the necessity of caring for the sick themselves; the strictly medical side of prevention, consisting in education, segregation, and treatment, is also vitally important. Granting that our armamentarium is not yet fully adequate to deal with the latter phase of this subject, we must not relax our efforts along these lines, because of the existence of the other phase, and the greater impossibility of remedying it, at least with any means at our disposal. For, indeed, it would mean even more than the wiping out of the slums or their rebuilding. But speaking for the medical and sociological side of this crusade, I clearly foresee, and, indeed, it has already been sufficiently demonstrated, that as the work is developing and will develop, we shall be increasingly able to cope with a large measure of success with this problem.

In Philadelphia one year ago the only Tuberculosis Dispensary south of Market Street was that of the Phipps Institute; today there are three special dispensaries: one at Third and Pine Streets (about to be established by the Jefferson Hospital), one at Seventh and Lombard Streets (the dispensary of the Phipps Institute), one at Twenty-sixth and Gray's Ferry Road (the most recently established of the State dispensaries). It may be said with justice that the area of the city south of Market Street, and in West Philadelphia south of Woodland Avenue (for the Gray's Ferry State Dispensary admirably drains this section),

is as adequately covered as could be wished, and as adequately as any similar section in any great city in the world.

North of Market Street the city is not so well covered, though the central State Dispensary will move north this week to Seventeenth and Ridge Avenue, strategically a very favorable site to train the so-called Tenderloin and sections farther north; while still beyond are the Kensington and the Frankford State Dispensary caring for the districts of those names. In addition, many of the larger general hospitals have special Tuberculosis Dispensaries. In West Philadelphia north of Woodland Avenue there are the Tuberculosis Dispensaries of the Rush Hospital and the Presbyterian Hospital.

When one reflects that in 1907 the dispensary of the Phipps Institute was the only tuberculosis dispensary in Philadelphia the development within about five years has been astonishingly rapid and consistently efficient; and we may trust and believe that this progress will be correspondingly maintained in the future.

THE TREATMENT OF CHRONIC SCIATICA[1]

By MORRIS J. LEWIS, M.D.
AND
WILLIAM J. TAYLOR, M.D.

REPORT BY DR. LEWIS

The success following the surgical treatment of two cases of inveterate sciatica which Dr. William J. Taylor and myself have had under our care at the Philadelphia Orthopedic Hospital and Infirmary for Nervous Diseases has been so pronounced that we deemed the subject of sufficient importance to bring before the College.

While there is nothing new in the treatment followed, it has not received the attention that its merits deserve, and with the purpose of calling attention anew to the procedure this communication is made.

The term sciatica is commonly applied to all affections where pain in this nerve is the main symptom, but for the purpose of this paper a more exact diagnosis must be made.

J. Crawford Renton (*Scottish Medical and Surgical Journal*, Edinburgh, 1897, vol. i, page 35) reports four cases in which he operated by stretching the nerve and freeing adhesions, and considers the benefit consequent upon this operation was due to the removing of the adhesions and not to the stretching of the nerve The same writer (*Proceedings of the Royal Society of Medicine*, 1907-1908, vol. i, Surgical Section, May 12, 1908) reports

[1] Read April 2, 1913.

operating on 32 selected cases of sciatica by removing adhesions, with most satisfactory results, and divides sciatica into four classes:

1. Neuralgia of the nerve.
2. Neuritis.
3. Perineuritis.
4. A combination of neuritis and perineuritis.

He considers that it is all-important that a correct diagnosis be made as to which of these four divisions the case in question belongs, for it is only in those chronic cases in which adhesions due to a perineuritis, with or without neuritis, exist, that good will follow the operation, which consists of merely exposing the nerve and freeing it from all surrounding adhesions, the dragging on the nerve by these bands causing the pain. This operation is not indicated in any acute case of neuritis, for here the ordinary treatment for sciatica should be employed. Those cases due to spinal or pelvic or bone lesions, or those in which it is believed that a pure neuralgia or neuritis exists, evidently should not be considered here.

Nerve stretching, at one time advised, has been found to do good in but a few cases whether it is performed by the open method of exposing the nerve and forcibly stretching it or by merely extending the leg upon the thigh. Where good has followed these procedures it has in all probability been due to the stretching and tearing of the adhesions which have been the real cause of the trouble, and not to the stretching of the nerve itself.

Holmes, in Osler's *Modern Medicine*, vol. vii, speaks of the injection of saline solution "into the sheath of the nerve," and many writers speak as if the nerve had a distinct sheath enclosing it, but the two cases here reported had no such sheath, as the nerve lay between the muscles with but a slight filamentous covering. Injection of alcohol, advised by some, is not without its dangers, as this might cause a necrosis with serious after-effects.

Among the various treatments of ordinary sciatica due to a neuritis may be mentioned rest in bed, salicylates, iodides, splinting of the leg, local heat or even cold, iron and arsenic, electricity

in various forms, acupuncture, or actual cautery, but after these methods have been faithfully tried in combinations thought best to meet the indications of the case, and where the symptoms of neuritis have subsided and those of perineuritis or adhesions have taken its place, it is incumbent upon us to operate.

In cases of perineuritis the patient is usually able to lie in bed or to stand, without pain; there may be pain on pressure, but this is not as acute as where there is neuritis. The primary neuritis and the subsequent disuse of the leg may cause atrophy of the muscles, as seen in both of our cases. Cases of perineuritis may even be able to take a few steps without distress, but very soon such use of the leg brings on paroxysms of pain. Sitting, both on account of the pressure on the nerve and of the angular position of the leg, is more distressing than either standing or lying down, but naturally not so much so as where a neuritis exists.

The cases upon which this report is based are as follows:

Case I.—J. McG., aged fifty years, chauffeur. Family history negative. No history of rheumatism or of injury, unless frequent blows by the ball on the left thigh when playing cricket as a young man could be called so. Soon after coming to America in 1888 he noticed that he had occasional pain in left sciatic distribution. A severe attack followed this, lasting over one month, in which there was evidently a neuritis. Following this he had at varying intervals four more severe attacks, the last one coming on gradually in the spring of 1912, and was evidently mainly a perineuritis, as he was comfortable when lying down or standing, and even comparatively so when manipulating the clutch of the automobile with his left leg, but when sitting still after the day's work he had much pain. Walking for a few minutes brough on much pain, which was practically absent on starting to walk. Running the automobile soon became impossible.

He was admitted into the Orthopedic Hospital and Infirmary and was operated on in July, 1912. In his various attacks he had been more or less under my observation, and most of the ordinary methods of treatment were tried. Blistering and iodides during the neuritis stage gave him the most relief, but later these failed, evidently as he was mainly suffering from a perineuritis.

Dr. Taylor was asked to expose the nerve and to free it of all adhesions that might be present. Three weeks after the operation the patient was

able to walk home without pain, and after recuperating for a month was able to resume his occupation as chauffeur, which he has kept up constantly since then, running the automobile daily and sometimes all day, with no discomfort whatever, up to the present time (April, 1913). The atrophy which had affected the leg is, however, not yet entirely recovered from.

Case II.—W. H., aged thirty-five years, machinist. Admitted into hospital in November, 1912. Family history negative. Six years before coming under observation he had been operated on for gall-stones following typhoid fever.

One year before coming under observation he had had a severe attack of phlebitis in his right leg, and since then has had pain steadily in the course of his right sciatic. He had been habitually constipated. His occupation as machinist subjected him to heavy work and great strain and to great variations of temperature, but he had been unable to do any work whatever for one year on account of pain. He never used alcohol nor tobacco and denied venereal diseases.

On admission into the Orthopedic Hospital and Infirmary he was found to have great tenderness along the entire course of the right great sciatic, but there was no evidence of venous thrombosis or varicosities. There was considerable wasting of the right thigh and calf. He was placed on absolute rest, warmth to leg, and iodide of sodium.

The patient became comparatively comfortable when at rest or standing, but use of the leg brought on great pain. After a considerable period of time, as he made no further improvement, it was considered that he mainly suffered from a perineuritis, and it was decided to operate in the same manner as in Case I, in January, 1913. He made a rapid recovery and was able to leave the hospital in three weeks, suffering no pain. At the present time (April, 1913) he is free from pain except on deep pressure over the upper one-third of the scar. He can move his leg freely and walk without discomfort, and intends soon taking up his work again.

It is very strange that this operation with its very high percentage of success should have apparently fallen into oblivion after it had been once brought before the attention of the profession, and it is hoped that this report may awaken interest in this easily performed, highly successful and practically harmless operation which could be safely repeated should adhesions reappear.

Dr. Taylor will describe the operation and the findings at the time.

REPORT BY DR. TAYLOR

The treatment of chronic sciatica by operation is not new, but it certainly has not received the general recognition which its great merit deserves.

It should be undertaken only in cases of perineuritis or in those cases in which there is a combination of neuritis and perineuritis.

Sciatica is regarded by Sir William Gowers and Dr. Frederick Taylor as a true neuritis in the majority of cases, as is shown by anesthesia and muscular atrophy. Neuritis may be: (1) interstitial, affecting the connective tissue; (2) parenchymatous, affecting first the nerve fibers themselves; (3) a combination of the two.

When the neuritis affects chiefly the perineurium or sheath, the nerve fibers may escape serious damage. If it affects the endoneurium, then the nerve fibers are more likely to be affected. A new fibrous tissue may develop in the interstitial tissue and sheath, and around this a varying amount of pathological exudate or adhesions take place. In the parenchymatous form the disease begins in the nerve fibers and may lead to serious results.

Dr. Renton has operated upon 32 cases, and all have been benefited, not only at the time of operation, but have remained well, some for a period of thirteen years.

Our first case was operated upon July 15, 1912, and the great sciatic nerve exposed by an incision extending from the gluteal fold to the lower third of the thigh. An anomalous nerve was found, a very high bifurcation—in fact, two nerves instead of one. Both were congested and somewhat swollen, with firm adhesions binding them to the surrounding tissues, and with very dense adhesions between the two branches binding them together very firmly.

These adhesions were dissected off with great care, and the nerve freed for the full length of the incision. The condition was one of a perineuritis occurring in a nerve of anomalous development. This was undoubtedly a great factor in the production of the pain.

Our second case was operated upon January 24, 1913. An

incision was made from the gluteal fold some eight inches downward, and the great sciatic nerve exposed.

This nerve was found to be much redder than normal, and there was an anomalous branch coming off from the centre of the nerve, extending downward for two inches, where it branched into two parts, thus giving the appearance of an inverted Y, the two branches riding astride of the main nerve. There was also an anomalous branch from the outer side of the nerve, extending downward. Beneath the first branch, and particularly where it bifurcated and overrode the main nerve, there were many adhesions, with evidences of much former acute inflammation, binding this branch down upon the main nerve. These adhesions, which were very dense, were dissected away with great care.

From the moment the patient recovered from the effects of the anesthetic his relief from pain was complete, and from the time of operation until now (April, 1913) he has had no pain whatever. The sudden and complete relief from very severe pain, which had been continuous for fourteen months, pain which for twelve months had totally incapacitated him, cannot have been a coincidence, and must have been the direct result of freeing the anomalous branch of the nerve from its inflammatory adhesions.

In these two instances the nerve showed distinct departure from the normal, and it is a matter of great interest and importance to determine if there is often an anomalous condition of the great sciatic nerve in these cases of chronic perineuritic pain. Certainly in these 2 cases the anomalies of the nerve predisposed toward adhesions, in one instance binding together the two branches in the high bifurcation, and in the second binding the sheath of the main nerve and the overriding branch, thus preventing complete recovery from what might otherwise have been an ordinary attack of sciatica.

Dr. John C. Heisler, who has very kindly taken the trouble to look up the question of anomalies of the great sciatic nerve, states that consultation of Morris, Cunningham, Tolde, Sobotta, and Quain fails to reveal any anomalies of the great sciatic nerve other than the variations mentioned in the current text-

books. He has never met with any other anomalies than these. The McMurrich edition of Morris states that the internal and external popliteal nerves are separate from each other all the way up to their origin from the plexus in 10 per cent. of cases, and that in such cases the external popliteal nerve usually pierces the pyriformis; this coincides with Dr. Heisler's own experience. The nerve for the hamstring muscles may also be entirely separate up to the place of origin from the plexus. Quain mentions this particularly, and quotes Henle to the effect that the division of the sciatic into the internal and external popliteal nerves may take place below the popliteal space. He has found the two popliteals to emerge separately from the pelvis, a smaller trunk, evidently the external popliteal, piercing the lower part of the pyriformis, and uniting into a single trunk at or slightly below the lower border of the gluteus maximums, separating again near the middle of the thigh.

Nerve stretching would have done no real good to either of these patients, and no attempt at stretching was made, simply dissecting off carefully all of the adhesions. Nerve stretching has not proved of permanent benefit in many of the cases in which it has been practised, and of late years it has seldom been employed In one of Renton's cases (*Proceedings of the Royal Society of Medicine,* 1908, vol. i, Surgical Section, page 167) the sciatic nerve was stretched, but the pain returned, and on again exposing the nerve an adhesion was found extending up to the sciatic notch. When this was removed, as well as other adhesions about the external and internal popliteal nerves, the patient remained free from pain for many years.

When a case of sciatica has not been relieved by proper medical treatment, and especially when the patient is free from pain while resting in bed, and when pain is brought on again by the movements of the thigh, the nerve should be exposed by an incision and examined for adhesions. Small adhesions may disappear, but large and numerous adhesions will not. In all cases of perineuritis with many and large adhesions there must always be a certain amount of neuritis due to dragging upon the nerve by

adhesions, but this subsides after operation. Nerve stretching can only prove of value by breaking up adhesions, and as can readily be understood, it is only in very small and slight adhesions that any benefit can be expected. In large and numerous adhesions nothing short of a careful dissection with a knife can offer any possible relief.

This operation is one of little danger, does not expose the patient to serious risks, and offers great chance of permanent relief.

DISCUSSION

Dr. Astley P. C. Ashhurst: My own impression is not that the operative treatment of sciatica has fallen into "innocuous desuetude" on account of the surgeon, but that the physician has forgotten about it. For the last several years I have been asking my medical friends why surgeons see so few cases of sciatica. The evasive answer given usually implies that the patients are cured without operation. Dr. Lewis and Dr. Taylor, however, have found at least two patients who could not be cured without operation. I saw an article not long ago by a German surgeon named Pers, in which he reported 47 operations for sciatica, and among 42 uncomplicated cases there were only three recurrences. This large number of operations struck me as something extraordinary. Here, if a surgeon gets two cases in the course of a year or so we should think he was having large experience. This German surgeon found that in most of his cases the adhesions were far up in the sciatic notch, and the operation was more difficult than in exposing the sciatic in the upper part of the thigh. Yet if these high adhesions were not released, recurrence might take place.

The great difficulty lies in the selection of the right cases for operation. A great many cases called sciatica are simply instances of referred pain. I saw last autumn a patient who was thought to have sciatica; I made a diagnosis of Pott's disease. The man was subsequently admitted to Dr. Lewis' ward at the Orthopedic Hospital for some lung condition, and I had the privilege of seeing him again. He finally died from tuberculous meningitis. Another patient, recently in Dr. Harte's service at the Orthopedic Hospital, presented the typical deformity seen in cases of sciatica, with pain along the sciatic nerve. We made a diagnosis of sacro-iliac sprain, and after the application of a plaster jacket the man got well.

I wish the physicians would tell us the cause of the adhesions which are found around the sciatic; are they due to infection or to trauma? It seems rather unsatisfactory to do an operation to relieve a lesion of whose pathogenesis you have no idea.

Dr. John B. Roberts: Dr. Lewis and Dr. Taylor are right in saying that we surgeons and other medical men do not frequently enough submit cases of chronic neuralgia to surgical treatment. I have not cut down upon a nerve where subsequently another surgeon has operated and found a small tumor in that nerve. We overlook such things, because we do not make our diagnoses carefully; and when do not know the cause, fail to hunt for it. This paper will make us search more carefully for the cause in cases of pain along nerve trunks. In one case I resected the second intercostal nerve with relief to the patient. The same may be true of the lumbar nerves. One may have pain in the musculospiral nerve due to adhesions the result of fracture, or from cicatricial adhesions from wounds of the soft part. I was greatly relieved once when a man came to me with intense pain after having received a fracture of the humerus and followed by a stiff shoulder. In loosening up the stiffness under ether we fractured the bone. The man said when conscious: "I thank you, Doctor, you have relieved my pain; I think maybe you have broken my arm." We had relieved pressure from entanglement of the nerve in callus. The man was soon entirely well, good union taking place, and he was free from pain.

Dr. A. B. Hirsh: The papers read recall student days at the Pennsylvania Hospital when we saw those masters in surgery, Thomas G. Morton and Richard J. Levis, operate twice a week, and occasionally have such a case where the sciatic nerve would be stretched. It was done with success, the cases being shown afterward with gratifying result.

One of the speakers referred to chronic constipation as the cause of one of his patients' sciatica. I recall the detailed report of a series of cases in which sciatica was directly connected with constipation and intestinal torpor. This is entitled "Neuritis and its Relation to Intestinal Putrefactive Processes," by Graeme M. Hammond, M.D., in the twenty-fifth anniversary volume (1908) of the New York Postgraduate School and Hospital. Simple correction of the intestinal condition sufficed to bring about cure of all symptoms.

I would like to call the attention of the Fellows to a non-operative method of treating sciatica, particularly that variety which the speakers believe needs surgical treatment, the perineuritis with adhesions between the nerve and its sheath, this procedure is mechanical and allows of making an accurate diagnosis: It is by the use of the wave current, the high voltage, low ampèrage, static current evolved by William J. Morton and elaborated by Williman Benham Snow. The patient is

seated upon an insulated chair. The vacuum electrode is passed over the affected nerve outlining the painful areas. You can in this way readily locate the adhesions. They are then marked and the current cut off. There is applied a strip of *x*-ray metal, held by a bandage, and the current again turned on. You begin with a spark-gap of possibly half an inch because the area is too painful for a longer one. It is astonishing to find in how brief a time one is able to remove the ache. If the case is acute a week to ten days of daily applications will remove the exudate. Older cases will take a longer course. There is no question about the dependability of this method. Men in Philadelphia and other cities have been using the plan to the exclusion of operation for a number of years. Their reticence as to its efficacy is due to the desire to collect a large number of cases before the method is made more widely known.

Dr. Taylor, closing: I have nothing to add, except that I think it rather doubtful that any form of electrical current would have relieved the adhesions that we found in these two cases.

THE RECORDS OF CASES OF TETANUS IN PHILADELPHIA DURING RECENT YEARS[1]

By WILLIAM S. WADSWORTH, M.D.

During the past winter certain questions regarding the relation of vaccination to tetanus arose, and as a result I undertook to go over the public records of the city. The results were instructive to me, and it appeared desirable to place them before the profession in an easily accessible and usable form together with certain comments that make them more clear.

While the tables I here present are in a measure simply a copy of records, it must not be imagined that it required a small amount of labor to put the matter in its present shape. The mere copying of the reports of the Bureau of Health is a piece of purely clerical work, but the interpretation of the figures required not a little technical investigation, both professional and clerical. The work of collecting the figures for the table of causes of tetanus from the Coroner's records required the reading of over 25,000 verdicts in the Coroner's dockets, and these throw a light on the whole subject which I think is distinctly new.

A word as to the records in general. The reports of the Mayor of the city of Philadelphia have generally included reports of the causes of death as recorded by the Board of Health or the Bureau of Health. The reports for 1897 and 1898 did not contain such reports.

I have therefore filled in those years from the original sheets in the office of the records of vital statistics.

[1] Read May 7, 1913.

The manner of keeping the records of deaths has several times been changed. One very material change was made when tetanus of the newborn (neonatorum) was no longer classified as tetanus but was transferred to diseases of the newborn. Another change was made when the method was made to conform with the international system as adopted by the Bureau of Vital Statistics of the State Department of Health.

I have limited my table from the Board of Health to the time when traumatic tetanus was regarded as a disease and not as a complication following violence. Now that it is classified under the causes of violence the statistics are harder to analyze if in fact they are not entirely misleading. The only way that, with the present system, the true data can be obtained is by the study of the cards at Harrisburg, where, by the new system of card files the records can be sorted by machinery so that all cases of death in which a record of tetanus appears will be first sorted out in two groups—one of primary the other of secondary causes, and then by a subsequent sorting of these cards determining the cases in each county. The whole process is a wonder of simplicity, but still involves much care and labor, and requires a trip to Harrisburg and imposing on an already busy office there, work which I did not feel justified in asking. I have therefore limited my table to the years from 1885 to 1909, but the picture we can get of tetanus as spread over those twenty-five years is well worth while.

I have added a supplement to Table I, which covers the records from the beginning of such records, but I cannot speak with authority regarding this added list.

Table I shows how tetanus spreads over the years and how it occurs in relation to sex and age. The table is sharply divided by the year 1900, when tetanus of the newborn disappears, although it does not wholly disappear by reason of the extreme difficulty of sorting certain certificates of death, for here and elsewhere it is difficult to handle certificates written by physicians who have not the slightest comprehension of the problems of the clerks in a bureau of vital statistics.

TABLE I

	Tetanus.		Trismus.		Ages														
	Total.	Females.	Total.	Females.	Under 1 yr.	1–2	2–5	5–10	10–15	15–20	20–30	30–40	40–50	50–60	60–70	70–80	Over 80	Over 1 yr.	Total deaths in city by thousands.
1885	19	8	18	2	6	..	..	1	1	..	2	7	1	..	1	..	..	13	21.0
1886	24	9	19	7	5	1	1	2	2	..	3	6	1	3	..	..	..	19	20.0
1887	28	9	17	6	9	1	..	2	2	2	3	5	1	3	..	..	..	19	21.0
1888	27	10	11	3	12	..	1	2	..	..	5	3	1	2	..	1	..	15	20 0
1889	41	10	..	..	21	..	..	..	3	..	4	6	6	1	..	..	..	20	20.0
1890	38	17	..	..	25	..	..	2	..	1	4	2	1	2	1	..	..	13	21.0
1891	34	11	6	2	22	..	..	..	2	1	3	3	1	2	..	..	..	12	23.0
1892	36	12	..	..	14	..	1	2	1	4	5	2	5	2	..	..	..	22	24.0
1893	48	19	..	..	30	1	1	..	3	1	1	3	3	4	..	1	..	18	23.0
1894	50	17	..	..	29	1	2	..	2	2	6	4	3	1	..	..	..	21	22.0
1895	31	12	..	..	17	..	..	2	1	..	4	2	4	..	1	..	..	14	23.0
1896	44	19	..	..	22	1	..	1	1	1	5	6	4	2	1	..	..	22	23.0
1897	28	9	..	..	8	..	..	..	1	4	8	5	2	..	..	..	..	20	22.0
1898	29	12	..	..	13	..	..	2	3	1	3	3	3	1	..	..	..	16	23.0
1899	41	13	..	..	18	..	2	..	5	2	8	2	1	2	1	..	..	23	23.0
1900	37	11	..	..	6	..	1	2	5	1	6	4	7	5	..	..	..	31	25.0
1901	29	7	..	..	4	..	1	4	1	6	1	6	4	1	1	..	..	25	24.0
1902	29	11	..	..	6	..	..	2	3	1	7	4	5	1	..	..	..	23	23.0
1903	44	13	..	..	8	..	3	3	11	3	6	5	3	2	..	..	..	36	25.0
1904	19	7	..	..	3	..	..	1	4	2	3	1	1	2	2	..	..	16	25.0
1905	20	5	..	..	2	..	..	1	..	1	7	3	3	2	1	..	..	18	24.0
1906	20	3	..	..	1	..	..	1	3	1	2	4	4	4	..	..	..	19	27.0
1907	27	8	..	..	5	..	2	2	5	2	4	2	4	1	..	..	..	22	27.0
1908	29	4	..	..	1	..	..	2	2	4	6	7	2	3	2	..	..	28	26.0
1909	24	5	..	..	..	..	..	6	6	2	3	2	1	3	1	..	..	24	24.0
	796	261	..	..	287	5	15	40	67	42	109	97	71	49	12	2	..	509	

NOTE.—The column trismus includes cases tabulated as tetanus neonatorum or nascentium and trismus neonatorum or nascentium.

SUPPLEMENT TO TABLE I

	Tetanus.		Trismus.		Ages.													Total deaths in city by thousands.
	Total.	Females.	Total.	Females.	Under 1 yr.	1–2	2–5	5–10	10–15	15–20	20–30	30–40	40–50	50–60	60–70	70–80	Over 80	Over 1 yr.	
1860	21	8	..	..	2	..	2	..	2	1	7	3	3	..	1	..	1	19	
1861	26	8	..	..	9	2	1	1	1	2	1	5	..	2	2	..	..	17	13.5
1862	27	8	..	..	4	1	..	5	3	4	3	2	2	1	1	1	..	23	13.8
1863	26	4	..	..	8	..	..	1	3	1	6	4	3	..	..	..	..	18	14.2
1864	31	9	..	..	7	..	..	2	4	2	7	3	3	1	2	..	..	24	15.8
1865	29	7	..	..	11	..	1	4	2	..	1	7	2	1	..	..	..	18	15.6
1866	28	8	..	..	7	..	..	1	2	2	7	5	1	2	..	1	..	21	15.3
1867	23	7	..	..	6	..	1	4	2	1	3	2	3	..	1	..	..	17	12.6
1868	22	3	..	..	7	..	3	1	..	3	3	2	..	3	..	..	..	15	13.3
1869	28	6	..	..	6	1	1	3	2	2	5	6	..	1	..	..	1	22	13.4
1870	44	10	..	..	11	1	2	3	9	1	10	2	5	..	..	..	..	33	15.3
1871	37	11	..	..	9	..	2	1	5	3	9	2	2	2	2	..	..	28	15.4
1872	32	9	..	..	14	1	..	1	4	3	4	2	1	1	1	..	..	18	18.9
1873	45	18	..	..	19	..	2	1	2	6	7	3	2	1	1	1	..	26	15.2
1874	22	6	18	10	2	..	1	1	2	4	4	3	4	..	1	..	..	20	15.2
1875	30	6	19	14	6	..	2	3	3	5	4	4	2	1	..	..	..	24	17.8
1876	31	3	22	10	5	..	..	1	7	1	6	4	2	3	2	..	..	26	18.8
1877	28	2	15	8	3	..	1	3	1	7	3	5	2	2	1	..	..	25	16.0
1878	16	1	20	9	1	..	..	1	6	1	1	2	..	..	3	1	..	15	15.7
1879	30	7	15	4	4	..	..	2	6	3	3	7	2	..	2	1	..	26	15.4
1880	67	8	7	3	4	1	1	2	26	10	6	9	2	2	2	2	..	63	17.7
1881	39	8	20	10	5	..	1	2	6	5	5	3	5	4	1	2	..	34	19.5
1882	32	9	12	7	3	..	1	2	7	1	7	2	3	3	2	1	..	29	20.0
1883	29	9	18	7	3	..	..	4	..	4	7	2	6	2	1	..	..	26	20.0
1884	26	9	19	7	7	1	..	3	3	2	5	2	..	2	..	..	..	18	20.0
	769	184	..	..	164	8	22	52	108	74	124	90	55	34	26	10	2	605	

NOTE.—At the present time it is not possible to explain the peculiarities of this table. Board of Health records begin 1860.

I have, in the next to the last column, placed the number of cases of tetanus over one year of age. It will be seen that over one-half of the tetanus for the ten years before 1899 was in cases under one year. It appears to affect male and female babies in fairly equal numbers, but in adults tetanus is much more frequent in males. I have purposely left out many considerations, such as the total deaths—the death by ages and by sexes from these notes—because the picture presented by the table is sufficiently clear as it stands without comment. Doubtless any tables founded on physicians' certificates must contain such errors of diagnosis as we know are likely to be made, but those tend to neutralize themselves and agree, for where one case has been wrongly diagnosed tetanus another which was tetanus has been wrongly put down as something else, and the nature of the disease is such that the proportion of errors is relatively slight. The table therefore may be taken as a very close approximation of the actual number of cases in the city.

To this number must, however, be added a very minute number of cases that were classified as homicide or suicide. Also a few Fourth of July cases, where death occurred before the symptoms of tetanus became clearly marked and wounding was given as the cause. It will be seen that tetanus claimed on an average about twenty cases a year, mostly between the ages of from ten to forty years. This gives about one in a thousand deaths. It must also be remembered that this city is a great medical centre to which many desperate cases are brought from the surrounding country, and that many cases of tetanus originating in places where the diseases is common, die in the great hospitals and add to the city mortality from this cause. That this is true in regard to certain causes, especially those associated with violence, has been a matter of personal observation during the past fourteen years.

We now pass to a more minute study of tetanus.

In 1905 the Bureau of Health began the publication of the number of cases reported under the rules regarding transmissible diseases. This column has not the same value on account of the difficulty of enforcing the rule, so we see, for example, that in 1909

fewer cases were reported than died. It is, however, of some value in gaining a grasp of the whole problem, so I have included it. It will also be found by a study of the Bureau of Health Report that in 1910 the method of classifying causes of death has entirely changed in regard to tetanus, and I have therefore omitted the published figures for 1910 to 1911, because they are entirely misleading when taken in connection with previous years. The records of the Coroner's office furnish us an instructive column.

TABLE II

	Bureau of Health Records.						Coroner's Records.	
	Vaccination inspector's schools. Police surgeon.	Virus to hospitals and physicians.	Total virus.	Tetanus cases reported.	Deaths classified as tetanus.	Deaths over one year old.	Cases investigated.	Cases where question as to vaccination arose.
1905	18,496	.....	...	23	20	18	12	
1906	11,690	.....	...	32	20	19	17	
1907	9,690	.....	...	38	27	22	29	
1908	7,288	26,712	34,000	48	29	28	26	
1909	11,895	28,505	40,400	17	24	24	25	3
1910	45,682	19,318	65,000	30	Tabulation changed so as to agree with rule of State Board adopting international classification of death.		24	4
1911	12,398	31,785	44,183	24			21	3
1912	40,844	5,442	40,844	..			24	2
			224,427					

The law provides that the Coroner shall investigate all cases where violence appears to have been associated with the cause of death. Tetanus cases, therefore, should be reported to the Coroner, and in fact most of them have been so reported in recent years. A few have escaped the vigilance of the clerks in the Bureau of Health and some few cases of idiopathic tetanus have been recorded without reference to the Coroner. In this table I have placed the records of vaccinations performed by the Bureau of Health and for five years the number of units of vaccine distributed by the Bureau of Health to hospitals and physicians

It is not possible to present at this time statistics regarding the vaccine sold by dealers, but it is probable that they would reach a total many times that presented. The fact, however, is clear that the ratio of tetanus to vaccination is infinitesimal. When

we compare the 224,000 units of Bureau of Health vaccine with the twelve cases of tetanus and remember that several of them were out-of-town cases, and that in only two cases of death were we able to trace the virus to the Bureau of Health, and in nearly every case we obtained a clear history of subsequent infection of the wound. When all these facts have been given their true value the probability of vaccination as a primary cause of tetanus practically vanishes.

I have listed the cases collected from the Coroner's records because I believe they add something new to the literature on tetanus, and while they are not clinical studies, the data collected is of value and is not easily to be had.

TABLE III.—Tetanus by Months—Coroner's Records. 1905–1912

	1905	1906	1907	1908	1909	1910	1911	1912	
January	..	1	6	2	..	..	1	1	11
February	..	..	1	3	1	..	1	1	7
March	1	1	1	2	2	1	1	2	11
April	3	..	1	1	1	3	2	3	14
May	3	2	3	1	2	3	1	2	17
June	..	4	2	1	1	2	3	2	15
July	2	5	6	5	4	4	1	1	28
August	..	1	3	5	3	1	2	4	19
September	2	..	3	1	2	3	3	3	17
October	1	2	1	2	5	4	3	1	19
November	..	..	1	2	3	1	2	1	10
December	..	1	1	1	1	2	1	3	10
	12	17	29	26	25	24	21	24	178

Average per month 14.8.
The summer increase begins about the middle of April and falls off in November.
Out of 178 cases less than ½ (41) occurred in females, 23 of these being children.

TABLE IV.—Cases of Tetanus—Coroner's Records.

Died 1905.	Age.	Color.	Sex.	Social condition.	Cause.
Mar. 1	42	W.	F.	M.	Nail in foot.
April 6	9	W.	F.	S.	Nail in foot.
April 23	37	W.	M.	M.	Circular saw.
April 28	45	W.	M.	M.	Injury to leg.
May 11	39	W.	M.	M.	Nail in foot.
May 19	61	W.	M.	M.	Undetermined.
May 31	52	W.	M.	M.	Explosion of dynamite.
July 26	25	W.	M.	M.	Glass in foot.
July 31	45	C.	M.	M.	Injury of hand.
Sept. 7	27	W.	M.	S.	Injury of hand.
Sept. 25	25	W.	M.	M.	Nail in foot.
Oct. 26	55	W.	M.	M.	Nail in foot.

Died 1906.	Age.	Color.	Sex.	Social condition.	Cause.
Jan. 24	39	W.	M.	M.	Laceration of thumb.
Mar. 5	50	W.	M.	M.	Fall from scaffold.
May 4	37	W.	M.	S.	Crushed foot.
May 26	19	C.	M.	S.	Undetermined.
June 6	8	W.	M.	S.	Kicked by horse.
June 5	55	W.	M.	S.	Undetermined.
June 11	54	W.	M.	Widower	Dog bite.
June 30	24	W.	F.	M.	Undetermined.
July 12	12	W.	M.	S.	Undetermined.
July 18	22	W.	M.	S.	Crushed arm (machinery).
July 20	11	W.	M.	S.	Undetermined.
July 23	37	W.	M.	M.	Injury to foot.
July 27	48	W.	M.	M.	Undetermined.
Aug. 23	52	W.	F.	M.	Nail in foot.
Oct. 17	33	W.	M.	?	Fall of earth.
Oct. 25	10	W.	F.	S.	Nail in foot.
Dec. 27	15	W.	M.	S.	Splinter in finger.
1907.					
Jan. 2	15	W.	M.	S.	Injury hand (machinery).
Jan. 16	10	C.	M.	S.	Nail in foot.
Jan. 26	15 days	W.	F.	S.	Injury by fall.
Jan. 26	25	W.	M.	S.	Amputation of leg (trolley).
Jan. 30	40	W.	M.	M.	Injury to hand (tug-boat).
Jan. 30	40	W.	M.	M.	Injury to hand.
Feb. 16	55	W.	F.	M.	Splinter in hand.
Mar. 20	11	W.	F.	S.	Injury to tongue.
April 15	9	W.	M.	S.	Nail in foot.
May 1	56	W.	M.	M.	Following operation hemorrhoids.
May 25	62	W.	M.	M.	Injured by runaway.
May 30	26	W.	M.	?	Amputation legs (railroad).
June 17	4	W.	F.	S.	Following burns (bonfire).
June 18	31	C.	F.	S.	Nail in foot.
July 12	41	W.	F.	M.	Fire-arms (accident).
July 12	24	W.	M.	S.	Run over by wagon.
July 17	11	W.	M.	S.	Nail in foot.
July 16	8	W.	M.	S.	Injury to leg (brick).
July 28	22	W.	M.	M.	Fire-arms (accident).
July 27	16	W.	M.	S.	Nail in foot.
Aug. 2	18	W.	M.	S.	Nail in foot.
Aug. 14	9	C.	M.	S.	Nail in foot.
Aug. 24	59	W.	M.	M.	Nail in foot.
Sept. 1	37	W.	M.	S.	Nail in foot.
Sept. 13	9 days	W.	F.	S.	Neonatorum.
Sept. 30	18	W.	M.	S.	Fire-arms (accident).
Oct. 10	45	W.	M.	S.	Injury to foot (horse).
Nov. 16	30	W.	M.	S.	Nail in foot.
Dec. 26	55	C.	M.	Widower	Following ulcer of leg.
1908.					
Jan. 6	23	C.	M.	S.	Undetermined.
Jan. 16	12	W.	M.	S.	Nail in foot.
Feb. 2	30	C.	M.	S.	Splinter in finger.
Feb. 6	24	W.	M.	S.	Fire-arms (accident).
Feb. 9	35	W.	F.	M.	Injury by fall.
Mar. 6	42	W.	M.	M.	Injury to toe.
Mar. 26	17	W.	M.	S.	Injury to hand.
April 22	37	W.	M.	M.	Fire-arms (accident).
May 25	25	W.	M.	M.	Fall (trolley).
June 3	26	W.	F.	S.	Following burns.
July 8	26	W.	M.	M.	Undetermined.
July 5	12	C.	M.	S.	Broken arm (fall).
July 10	24	C.	M.	S.	Fire-arms (blank cartridge).
July 14	16	W.	M.	S.	Fire-arms (blank cartridge).
July 24	6	W.	M.	S.	Fall (from fence).

Died 1908.	Age.	Color.	Sex.	Social condition.	Cause.
Aug. 7	36	W.	M.	M.	Undetermined.
Aug. 16	26	C.	M.	M.	Unknown.
Aug. 25	50	W.	M.	M.	Injury to foot.
Aug. 28	8	W.	M.	S.	Cut hand (hatchet).
Aug. 30	35	W.	M.	S.	Nail in foot.
Sept. 30	19	W.	M.	S.	Nail in foot.
Oct. 9	60	W.	M.	M.	Splinter in hand.
Oct. 29	38	W.	F.	M.	Unknown.
Nov. 1	19	W.	M.	S.	Nail in foot.
Nov. 24	42	W.	M.	Widower	Fall.
Dec. 1	62	W.	M.	S.	Injury to foot (pick).
1909.					
Feb. 25	18	C.	F.	S.	Wound of scalp (homicide).
Mar. 21	15	W.	M.	S.	Fall in barn.
Mar. 28	61	W.	M.	Widower	Hit by falling object.
April 17	71	W.	M.	S.	Splinter in hand.
May 16	28	W.	F.	M.	Following abortion.
May 18	58	W.	M.	M.	Nail in foot.
June 27	19	W.	M.	S.	Fire-arms (accident).
July 4	43	C.	F.	S.	Nail in foot.
July 17	7	W.	M.	S.	Nail in foot.
July 18	3 mos.	W.	M.	S.	Splinter in foot.
July 20	14	W.	M.	S.	Fire-arms (toy pistol.)
Aug. 10	8	W.	M.	S.	Injury to foot.
Aug. 18	11	W.	M.	S.	Nail in foot.
Aug. 19	41	W.	M.	M.	Injury in hand (wagon).
Sept. 7	6	W.	F.	S.	Undetermined.
Sept. 19	6	W.	M.	S.	? Postvaccinal infection.
Oct. 8	68	W.	M.	M.	Kicked by horse.
Oct. 10	5	W.	M.	S.	? Postvaccinal infection.
Oct. 7	30	C.	M.	S.	Undetermined (doubtful).
Oct 15	6	W.	M.	S.	? Postvaccinal infection.
Oct. 19	63	W.	M.	Widower	Injury to hand (machinery).
Nov. 14	32	W.	M.	S.	Undetermined.
Nov. 22	12	W.	F.	S.	Fall.
Nov. 28	10	W.	F.	S.	General injury (trolley).
Dec. 6	14	W.	M.	S.	Injury to leg (bale hoop).
1910.					
Mar. 1	35	W.	M.	M.	Firearms (accident).
April 6	37	W.	M.	M.	Injury to foot (trolley).
April 8	48	W.	F.	M.	Splinter in foot.
April 12	12	W.	M.	S.	General injuries (wagon).
May 15	8	W.	F.	S.	Nail in foot.
May 27	31	W.	M.	M.	Crushed foot (wagon).
May 29	38	W.	F.	M.	Fall from ladder (?).
June 28	26	W.	M.	S.	Fall from window.
June 29	19	W.	M.	S.	Nail in foot.
July 6	8	W.	F.	S.	Nail in foot.
July 11	7	W.	M.	S.	Fire-arms (blank cartridge).
July 17	16	W.	M.	S.	Fire-arms (blank cartridge).
July 20	8	W.	M.	S.	Cut finger (hatchet).
Aug. 9	3+	W.	F.	S.	Injury to foot (trolley).
Sept. 16	6 days	W.	M.	S.	Neonatorum.
Sept. 11	53	C.	M.	Widower	Nail in foot.
Sept. 25	41	W.	M.	M.	Injuries by wagon (?).
Oct. 5	6	W.	F.	S.	Postvaccinal infection.
Oct. 16	7	W.	M.	S.	Postvaccinal infection.
Oct. 25	8	W.	F.	S.	Fall from fence.
Oct. 31	5	W.	M.	S.	Injury to foot.
Nov. 15	4	W.	F.	S.	? Postvaccinal infection.
Dec. 4	6	W.	F.	S.	? Postvaccinal infection.
Dec. 12	32	W.	M.	S.	Injury to hand (tore off dressings)

Died 1911.	Age.	Color.	Sex.	Social condition.	Cause.
Jan. 1	5	W.	M.	S.	Injury to hand (fall).
Feb. 10	28	W.	F.	M.	Following abortion (accident.)
Mar. 20	47	C.	M.	M.	Injury to finger.
April 15	12 days	W.	M.	S.	Neonatorum.
April 19	19	W.	M.	S.	Injury to hand (machinery).
May 10	24	W.	M.	S.	Nail in foot.
June 9	23	W.	M.	S.	Injury to finger (machinery).
June 13	51	W.	F.	Widow	Nail in foot.
June 28	46	W.	M.	M.	Injury to hand (fall).
July 3	10	W.	M.	S.	Injury to arm (at play).
Aug. 1	14	W.	M.	S.	Injury to hand (machinery).
Aug. 27	41	W.	M.	M.	Injury to finger (tin cut).
Sept. 12	6	W.	M.	S.	? Postvaccinal infection.
Sept. 24	6	W.	F.	S.	? Postvaccinal infection.
Sept. 20	34	W.	F.	S.	Following vaccination.
Oct. 13	17	W.	M.	S.	Injury to hand.
Oct. 25	44	W.	F.	M.	Injury to leg (fall).
Oct. 22	34	W.	M.	S.	Injury to thumb (?).
Nov. 16	69	W.	M.	M.	Injury to hand (machinery).
Nov. 26	5 days	W.	M.	S.	Neonatorum.
Dec. 7	7	C.	F.	S.	Injury to leg (railroad).
1912.					
Jan. 16	30	W.	M.	S.	Fall from wagon.
Feb. 15	38	W.	M.	M.	Injury to finger (machinery).
Mar. 2	64	W.	F.	Widow	Injury to leg (fall down stairs).
Mar. 24	4	W.	F.	S.	Injury to wrist (fall on rusty nail)
April 19	12	W.	M.	S.	Injury to arm (fall from tree).
April 21	9	W.	F.	S.	Nail in foot.
April 28	46	W.	M.	M.	Injury by fall of earth.
May 2	12	W.	M.	S.	Nail in foot.
May 19	17	W.	M.	S.	Nail in foot.
June 2	9	W.	M.	S.	Splinter in hand.
June 9	4	W.	M.	S.	Injury to foot (trolley).
July 15	36	W.	M.	M.	Nail in foot.
Aug. 11	7	W.	M.	S.	Nail in foot.
Aug. 21	4	W.	F.	S.	? Postvaccinal infection.
Aug. 27	31	W.	M.	M.	Injury to finger.
Aug. 30	9	W.	F.	S.	Nail in foot.
Sept. 7	34	C.	M.	M.	Nail in foot.
Sept. 4	7	W.	M.	S.	General injuries (trolley).
Sept. 17	5	W.	M.	S.	? Postvaccinal infection.
Oct. 3	42	W.	M.	M.	Nail in foot.
Nov. 8	34	W.	M.	S.	Undetermined.
Dec. 10	28	W.	M.	S.	Injury to finger.
Dec. 11	23	W.	M.	S.	Injury to foot (Baldwin's).
Dec. 22	13	W.	M.	S.	Nail in foot.

TABLE V.—Causes of Tetanus—Coroner's Records. 1905–1912.

			Females.
Nail in foot	40		11
Injury to foot.	10		1
Total foot		50	12
Injury to hand	16		1
Splinter in hand	6		1
Total hand		22	
Undetermined		17	3
Injured by fall		15	7
Injured by fire-arms	7		1
Injured by blank cartridges	4		
Injured by toy pistol	1		
Total fire-arms		12	1
Injured by horse and wagon		10	
Injured by machinery		10	
Injured by trolley		7	2
Injured by railroad		2	1
Injured by falling earth		2	
Injured by explosion		1	
Injured by falling objects		1	
Injured by dog bite		1	
Injury to arm		1	
Injury to leg		4	
Injury to tongue		1	1
Following abortion		2	2
Following burns		2	2
Following operation		1	
Following vaccination		12	6
Homicide injury		1	1
Neonatorum		4	1
		178	42

TABLE VI.—Postvaccinal Tetanus.—Coroner's Records.

1909.

1. Out-of-town case. Physician's child. Other children vaccinated at same time well; vaccinated September 9. First symptoms October 5; died October 10. Father of child believes tetanus entered by secondary infection.
2. Onset four weeks after vaccination. Physicians believed due to subsequent infection.
3. Vaccinated September 6. Split tube between two brothers. Scab knocked off about week before onset; died October 15. Medical testimony and verdict: accidental infection of vaccination wound.

1910.

4. Vaccinated September 7. Hurt scab September 23 at play; died October 5.
5. Vaccinated September 21. Hurt arm October 4; onset of tetanus October 13; died October 16.
6. Vaccinated October 26. Several children at same time. Onset November 13; died November 15. All agree secondary infection.
7. Vaccinated November 5. Played about stable; died December 4. Believed to be secondary infection of wound.

1911.

8. Vaccinated about August 15; died October 12. September 4 scar was very dirty. Onset of tetanus October 11; 10 tubes at a time. Believed to be secondary infection of wound.
9. Vaccination August 28. Infected on farm September 10. Pus from arm September 12; onset of tetanus September 22; died September 24. Clearly a case of secondary infection. Out-of-town case.
10. Vaccinated September 5. Others at same time; died September 20. Unable to be positive as to cause verdict "following vaccination."

1912.

11. Vaccinated July 17. Had open sores on finger and ear. Sent to country. Pulled off scab about August 3. Developed tetanus August 17. Died August 21. Possibly secondary infection of scar of other wounds.
12. Vaccinated about September 1. Subsequently ran splinter in hand, which was infected: developed tetanus about September 16. Died September 17, with characteristic methods of falsehood and misrepresentation; certain antivaccinationists suppressed the evidence regarding the splinter while attempting to use the case in the interest of pestilence.

I am under obligations to the attaches of the Bureau of Health, especially to Mr. Atherholt, chief registration clerk, for courtesy and assistance while studying the records.

DISCUSSION

Dr. Leonard D. Frescoln: Dr. Wadsworth has shown us the importance in the matter of statistics of having tetanus and tetanus neonatorum reported as such. All these cases are to be reported to the Board of Health and deaths from the same to the Coroner in Philadelphia. Another important point is that of the vaccination cases. I know of no case in which it has been proved that the virus carried the tetanus germs. That which most likely does occur is contamination of the wound from dirt and neglect on the part of the family and bad environment. The amount of tetanus in this city is by no means represented by the statistics of death because in this day we find a number of tetanus cases that are cured.

Dr. Charles M. Montgomery: I should like to ask Dr. Wadsworth whether he had knowledge of any cases in which tetanus infection has resulted from chronic ulcers or chronic sores and not from any acute recent injury to the skin.

Dr. Wadsworth, closing: I would say in regard to infection of old lesions that we have records of three or four—one an old leg ulcer; another, an old injury to the arm, a horse and wagon injury. In investigating the injuries you often have to rely upon the statements of stupid

people, and again the medical man may not have had time to study the case. Regarding the reference to vaccination made by Dr. Frescoln, I have not been able yet to trace a case of tetanus to this source. I have given the data of one case very much talked about and made use of by unscrupulous people. The child was vaccinated in Camden. A month afterward it was sent up into the country. It was playing about in the dirt and two days afterward the arm commenced to suppurate and eight days afterward tetanus developed. It is, of course, absurd to classify that as one of infection at the time of vaccination. We know that the infection has a definite incubation of a few days and not more than ten. Most of the cases of tetanus neonatorum develop within seven or eight days. When you have a case going along for three weeks, then giving a clear history of infection and six or eight days afterward coming down with tetanus, it would be absurd to suppose that the germ had taken an unusual course. We had one child with the history of a sliver in the finger. The finger was swollen up undoubtedly because the sliver was a source of secondary infection and not because of the vaccination.

Any vaccination wound is likely to be infected if carelessly handled. The largest number of cases reported in one year is 50, that year 29 deaths are credited to tetanus under one year. The tables show that there is not a vast number of tetanus cases in town. One death by tetanus in about a thousand from all causes.

THE TOTAL NON-PROTEIN NITROGEN OF THE BLOOD IN NEPHRITIS AND ALLIED CONDITIONS [1]

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AND

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In 1836 Richard Bright,[2] referring to renal disease, stated: "The chemical qualities of the blood are so far changed that urea is to be detected in that fluid, or, at all events, certain constituents scarcely distinguishable from it;" and he expressed the opinion that the occurrence is "a source of disease springing immediately out of the defective action of the kidney." Seventy years later, Friedrich Müller[3] emphasized the fact that "insufficiency of nitrogenous excretion leads to a definite increase in the retention nitrogen of the blood, particularly in those groups of kidney disease in which experience has shown the danger of uremia." These statements embody all that can be asserted with positiveness at the present moment. The attempt to find an invariable relation between the retained nitrogen of the blood and the degree of uremic intoxication has not been successful. On this account, and because the methods in use until recently required considerable quantities of blood, at least five times as much as the procedures we have employed, the determination of the nitrogen or urea

[1] Read May 7, 1913.

[2] Guy's Hospital Reports, 1836, i, 338.

[3] Verhandl. d. deutsch. path. Gesellsch., 1905, ix, 64.

of the blood has not become a routine means of studying the efficiency of the renal function.

Strauss[1] and others, a decade ago, tried to connote nitrogen retention with definite pathological types of nephritis, but without success. Widal[2] has viewed the subject from a different angle and has defined several distinct types of disturbed renal function. He has erred in theory, perhaps, by being too schematic, and in practice by relying on unreliable methods. Thus Rowntree and Fitz[3] state that the hypobromite method for urea in the blood, as employed by Widal, is subject to an error of from 10 to 60 per cent. Folin,[4] within the last year, by introducing chemical methods which permit of rapid and accurate analyses of both urea and total non-protein nitrogen in minimal quantities of blood, has greatly extended the possibilities of this mode of examination.

The present report deals with the results of our study of the blood by Folin's methods in a series of fifty-nine hospital patients.[5] Our main concern has been with nephritis, but we have examined the blood in many other conditions, as opportunity offered.

Throughout the paper we use the term non-protein nitrogen to indicate the nitrogen not precipitable by the methyl alcohol and zinc chloride of Folin's method. The terms retention nitrogen, waste nitrogen, or extractive nitrogen should perhaps be discarded in favor of descriptive appellations such as non-protein nitrogen, incoagulable nitrogen, or simply filtrate nitrogen. This has been suggested by Folin's experiments, which indicate that a small fraction of the non-protein nitrogen may be not a waste product, but amino-acids available for utilization by the body cells. The unmodified term urea is used to signify the ammonia-urea fraction; that is, the nitrogen determined by the urea method employed. Separate estimations of the ammonia were not made, as they seem

[1] Die chronischen Nierenentzündungen, Berlin, 1902.
[2] Bull. et mém. Soc. méd. d. hôp. de Paris, 1911, xxxii, series 3, 627.
[3] Arch. Int. Med., 1913, xi, 258.
[4] O. Folin and W. Denis, Jour. Biol. Chem., 1911–12, xi, 527.
[5] University of Pennsylvania Hospital, service of Dr. Alfred Stengel, and Philadelphia General Hospital, service of Dr. David Riesman.

not to be of clinical value. According to Folin, the older methods exaggerated the quantitative importance of the ammonia fraction. We used the technique described by Folin and his collaborators, and we met with no difficulties of importance.

METHOD

The principal steps in the analyses will be briefly enumerated, but the minor details, which, however, are essential in practice, will be omitted. The total nitrogen method is a miniature Kjeldahl method, while the urea method is an analogous modification of standard procedures. Accuracy is secured by careful measurements (special pipettes) and by substituting Nesslerization for titration in the final step. Minute amounts of ammonia which it would be impossible to estimate by the usual titrations are thus accurately determined.

A. Collection of Blood.—(1) 10 c.c. of blood are added to about 60 c.c. of pure methyl alcohol in a 100 c.c. volumetric flask, and after being shaken are diluted to volume with the same reagent. (2) After a few hours the coagulated blood is filtered off and the filtrate, clarified by the addition of a few drops of zinc chloride solution, is filtered again. Each 10 c.c. of filtrate represents 1 c.c. of the original blood.

B. Total Nitrogen Determination.—(1) 10 c.c. of the filtrate are measured into a large Jena test-tube and freed from alcohol by immersion in boiling water. (2) The organic matter is destroyed and the nitrogen converted into ammonium sulphate by digesting with potassium sulphate and concentrated sulphuric acid over a microburner. The fumes are carried off by special absorption tubes connected with a suction pump. (3) The ammonia is set free by the addition of an excess of sodium hydrate solution and is driven over into dilute hydrochloric acid by a powerful air blast. (4) The acid solution is transferred to volumetric flasks of suitable volume, treated with a definite quantity of dilute Nessler's solution, and made up to volume. (5) The deep amber color which develops is compared, by the aid of a colorimeter, with that of an ammonium sulphate solution of known strength, similarly treated. From the colorimetric readings the amount of nitrogen is easily calculated.

C. Urea Determination.—The urea method is similar in most respects. The alcohol is removed by the aid of moderate heat (50° C.) and an air current. A higher temperature is avoided, as it might decompose the urea. Digestion is then carried on by the aid of acetic acid and fused sodium acetate at a temperature of 150° C. A condenser is used

and the proper heat regulated by the aid of a temperature indicator which is sealed in a glass ampoule and floated on the boiling fluid. The remaining steps are almost identical with those used for the total nitrogen. As we have previously stated, the figures for urea thus obtained include the preformed ammonia.

The results in both cases are stated in terms of milligrams per 100 c.c. of blood. In the literature these values are occasionally stated as grams per liter. Where we have had occasion to refer to such figures we have converted them into milligrams per 100 c.c., *i. e.*, 0.25 gm. per liter is equal to 25 mg. per 100 c.c.

In collecting the blood from the vein we used an accurately graduated syringe, and in most instances we removed 10 c.c. (diluted to 100 c.c.) rather than the smaller quantity originally recommended. This has supplied sufficient filtrate to permit of duplicates both for the nitrogen and urea estimations and also for re-tests when required. However, 2 c.c. would suffice for the nitrogen estimation in case of necessity.

In order to permit of many examinations at one time we installed an apparatus providing space for eight simultaneous digestions of either nitrogen or urea. A rocking bar containing the tubes leading to the glass suction pump allowed adjustment of the fume extraction tubes without danger of breakage, a convenient modification of the original apparatus. As we also provided an equal number of evaporating and blow-over units, it was possible for two persons to complete from twenty-four to thirty-two tests in an afternoon, or, in other words, to examine six or eight specimens for both urea and total filtrate nitrogen with duplicates in each case. The evaporation of the alcohol from the specimens consumes the most time, particularly in the case of urea. This can be lessened for the urea if the capillary tubes are made of fairly large caliber. It is very important to have good test-tubes of thin Jena glass (Schott); thick tubes, even of the best quality, are of no use and at first caused much delay and the loss of several important specimens. We used large round bulbs[1] on our blow-over tubes instead of the vertical pipette-like ones originally recommended. As a result, we never had the slightest loss of fluid with the strongest air current. Also, we have found it essential to cover the rubber stopper connections with water before the air is turned on so as to detect at once any loss by leakage. In Nesslerization we used the Winkler modification, and we had no difficulty with cloudiness except rarely after too rapid mixing or in too concentrated solutions.

Control experiments were made on a watery solution of urea which theoretically should have shown 50 mg. of nitrogen per 100 c.c., and

[1] This was suggested by Mr. Farmer, of Dr. Folin's laboratory.

which gave the following results by the total nitrogen method: 49.7, 49.5, 50.0, and 49.7 mg. With the urea method results were far less uniform, and here slight variations in technique were found to be of great moment. Eventually satisfactory analyses by the urea method gave 50.0 and 47.4 mg. Under conditions analogous to those used in blood examinations, *i. e.*, in methyl alcohol solution, the results by the total nitrogen method were 47.7 and 49.8 mg. In actual blood examinations we found the greatest range of error when it was necessary to Nesslerize in small volumetric flasks (25 or 10 c.c.) This we attributed to the incomplete washing of delivery tubes and receivers necessitated by the narrow margin of fluid available. Taking our duplicate results serially in forty-four consecutive examinations, we found that the total nitrogen estimations showed variations from the average ranging up to 2 mg. per 100 c.c. of blood, and the urea up to 1.5 mg. The average difference between duplicates in total nitrogen estimations was 1.6 mg. per 100 c.c. of blood, and in the urea estimations 1.4 mg.

Analyses of the various reagents by means of blanks showed appreciable impurities in the potassium sulphate and kerosene; in the quantities used they introduce an error which when calculated for 100 c.c. of blood amounts to about 2 mg.; the quantity of these reagents used in the same in every analysis. Finally we have convinced ourselves by experiment that the slight brownish cloud which occasionally forms in the filtrate on long standing does not represent an appreciable quantity of nitrogen.

Before reporting our own figures we shall present some results obtained with the older methods, as used by other investigators. The principal variation in the methods employed has been in the manner of precipitating the albumin. Serum has generally been preferred to blood, and the nitrogen estimations have almost invariably been made by the Kjeldahl method, variously modified. The methods of precipitation are of several types. Widal's method, as used by Rowntree and Fitz,[1] was as follows: 10 c.c. of blood were added to 115 c.c. of 95 per cent. alcohol, 100 c.c. of the filtrate representing 8 c.c. of blood. This was evaporated to dryness preparatory to making the estimation by the Kjeldahl method. Jackson and Saili[2] used a similar technique, but washed and ground up the coagulated blood protein with 95 per cent. alcohol, after which filtrate and washings were united. Limbeck and Pick,[3] who seem to have been the first to use the Kjeldahl method for estimating the nitrogen of the blood, used an alcohol extraction method. Strauss[4] ran the blood serum into five volumes of boiling distilled water

[1] Loc. cit.
[2] Arch. Int. Med., 1912, ix, 79.
[3] Cited by G. Ascoli, Vorlesungen über Urämie, Jena, 1903.
[4] Loc. cit.

and then added an amount of 2 per cent. acetic acid previously determined to be sufficient to cause a flaky coagulation. The solution was then filtered, washed with distilled water, tested for albumin, and evaporated to a fixed volume. Folin has recently simplified this process in connection with his uric acid method,[1] but he does not believe that the filtrate is uniformly free from albumin. Obermayer and Popper[2] acidified 20 c.c of blood with dilute acetic acid, and boiled, filtered, and washed the solution with hot water. The filtrate and wash water were united. Hohlweg[3] added a special reagent consisting of acetic acid and monocalcium phosphate, and boiled the solution after half saturation with sodium chloride.

In Table I are given a few figures collected from the literature, indicating the range of non-protein nitrogen found by these methods in the blood in different conditions.

It will be noticed that almost all the results reported range much higher than our own. We thought that this might be due to the use of serum instead of whole blood, as in our work. To determine this point we made parallel observations on two cases, taking both whole blood and serum and analyzing each by Folin's method, with the following results:

No. of case.	Whole blood.	Serum.
69	34.8	41.3
75	30.0	30.0

These results, therefore, do not explain the higher results obtained by those who have worked with serum. Folin attributes the discrepancy to the faulty methods of precipitation generally employed. The figures that follow (Table II) are from Folin's recent article,[4] and, as they are based on the same method, are therefore more strictly comparable with our own.

Folin states that renal lesions were not by any means excluded in all cases. The urea, on the average, constituted from 50 to 56 per cent. of the total non-protein nitrogen; in the most marked cases of nitrogen retention it went up to 70 per cent.

[1] O. Folin and W. Denis, Jour. Biol. Chem., 1912–1913, xiii, 469.
[2] Zeitschr. f. klin Med., 1911, lxxii, 332.
[3] Deutsch. Arch. f. klin. Med., 1911, civ, 216.
[4] O. Folin and W. Denis, Jour. Biol. Chem., 1913, xiv, 29.

TABLE I

Author.	Diagnosis.	Number of cases.	Mg. of total nitrogen per 100 c.c.		Notes.
			Maximum.	Minimum.	
Strauss	Chronic interstitial nephritis	28	116	82	
Strauss	Chronic interstitial nephritis with uremia.	19	266	68	
Strauss	Chronic parenchymatous nephritis.	10	152	25	
Strauss	Chronic parenchymatous nephritis with uremia	4	80	36	
Strauss	Transitional forms.	5	75	38	
Strauss	Transitional forms with uremia.	14	79	25	
Strauss	Liver diseases.	4	112[1]	29	
Strauss	Uncompensated heart disease.	8	70	31	
Strauss	Febrile diseases.	6	91	48	
Strauss	Miscellaneous diseases.	6	76	22	
Strauss	Normal individuals.	5	34	23	
Ascoli	Non-nephritics.	24	184	19	This includes many cases from the literature, but not Strauss'.
Ascoli	Nephritics.	30	212	14	
Obermayer and Popper	Uremia.	30	658	33	Only 5 below 100.
Obermayer and Popper	Nephritis without uremia.	5	350	56	
Obermayer and Popper	Normal individuals.	2	36	35	
Obermayer and Popper	Pneumonia	8	297	39	
Obermayer and Popper	Septic diseases.	4	119	44	
Obermayer and Popper	Heart failure and emphysema.	7	290	24	
Obermayer and Popper	Cerebral disease.	10	81	33	
Obermayer and Popper	Liver diseases.	4	77	42	
Hohlweg	Healthy kidneys.	10	60	41	
Hohlweg	Nephritics.	12	93	50	
Hohlweg	Uremia (with recovery)	4	96	62	
Hohlweg	Uremia (fatal)	9	340	117	
Hohlweg	Fatal nephritis without uremia.	7	370	144	
Hohlweg	Moribund cases not dying of nephritis.	11	95	49	
Rowntree and Fitz	Nephritics.	5	280	30	
Rowntree and Fitz	Passive congestion with and without nephritis.	8	280	60	
Rowntree and Fitz	Normal individuals.	3	70	30	
Monakow	.....	2	98	83	
Foster	Nephritics.	16	393	43	
Foster	Normal kidneys.	5	76	33	
Widal	Nephritics.	31	..	200	Urea only was determined (hypobromite method).

[1] Agonal.

TABLE II

Diagnosis.	No. of cases.	Mg. of total nitrogen per 100 c.c.		Mg. of urea nitrogen per 100 c.c.	
		Maximum.	Minimum.	Maximum.	Minimum.
Normal individuals	16	26	22	13	11
Syphilitics . .	63	45	22	26	13
Insane . . .	21	62	24	46	13
Nephritics . .	11	96	38	68	19

In Table III are summarized the essential features of the fifty-nine individuals that we have studied. They fall readily into four divisions: (1) those showing no disturbance of renal function; (2) those with marked cardiovascular disease of some type, a certain number of which show urinary changes as the result of renal congestion; (3) those showing nephritis; and (4) those in which certain features lead one to suspect nephritis, but in which the existence of nephritis is not certain.

All the cases of Group 1 were free from definite evidences of renal disturbance. Four showed an occasional trace of albumin in the urine (Table III). Examination of the non-protein nitrogen column (Table III) shows that all the figures lie between 15 and 43. The ammonia-urea fraction, if we except one case of acute leukemia, constitutes less than 70 per cent. of the total non-protein nitrogen.

Group 2 (Table III) falls naturally into three subdivisions: (*a*) individuals with cardiac disease, either myocardial, valvular, or pericardial; (*b*) those with aneurysm (2); (*c*) those in which arteriosclerosis was the most conspicuous feature, associated, however, with myocardial weakness. Most of the individuals of Group 2 showed albuminuria and casts, as a rule small in quantity. Of the four cases in which phthalein elimination was estimated two showed a moderately reduced output. The blood-pressure was within normal limits or low (divisions *a* and *b*); above normal (division *c*). Examination both of the non-protein nitrogen and of the ammonia-urea percentage shows that the figures lie within the same range as those of Group 1. The series is too small for final conclusions, but it suggests that nitrogen retention does not,

as a rule, accompany disturbances of renal function associated with chronic passive congestion, and that we may have here a method of distinguishing more serious renal involvement from mere congestion.

Group 3 falls into five divisions: (*a*) chronic nephritis with marked albuminuria and cylindruria, marked edema, and little if any increase in blood-pressure; (*b*) chronic nephritis associated with marked arteriosclerosis and elevated blood-pressure—all cases over fifty years of age; (*c*) chronic nephritis in younger individuals, not conspicuously sclerotic, with high blood-pressure as a rule, with anemia, and with the frequent appearance of a few red-blood cells in the urine; (*d*) acute nephritis; (*e*) amyloid kidney. In both cases of the first subgroup, *a*, cardiac complications existed which render the findings somewhat difficult of interpretation; possibly they should be classified in Group 2. In both individuals the non-protein nitrogen and the ammonia-urea percentage lay within the limits established for Groups 1 and 2. Case 35 is of interest because of the constant presence in the urine of enormous numbers of epithelial and fatty casts and even of free fat droplets. Both cases averaged about seven grams of albumin per liter by Esbach's method. All the cases of subgroup 3, *b*, except one, showed albumin and casts in the urine, although at times only scantily. The specific gravity was low as a rule. In the majority, retinal changes existed. Anemia was not a conspicuous feature of the group except in two cases. The blood-pressure was above normal. The phthalein elimination, in the few cases in which it was determined, was low. Inspection of the non-protein nigrogen figures shows them to be 40 or above; the ammonia-urea percentages, except in Case 4, lie either at the extreme upper level of the range found in Group 1, or distinctly above it. In this group, therefore, we find for the first time constant evidence of nitrogen retention. It is of interest to note that the case showing next to the highest figures for non-protein nitrogen and the highest ammonia-urea percentages, as well as an extremely low phthalein elimination, showed no elevation of blood-pressure, no eye-ground changes, and no evidences of nephritis in the urine. The further course of this individual is being followed with special interest.

TABLE III.—*Group* 1

Serial No. of case.	Diagnosis.	Age in years.	Sex.	Total nitrogen in mg. per 100 c.c.	Urea nitrogen in mg. per 100 c.c.	Urea per cent.	Phthalein per cent., in 2 hrs.	Blood pressure.	Eye-grounds.	Albumin.	Casts.	Specific gravity.	Hemoglobin per cent.	Red-blood cells.
20	Postoperative adhesions.	18	F.	15.9	7.7	48.4	....							
19	Chronic gastritis.	34	F.	20.4	10.6	52.0	....	122–90	....	0	0	1.024	85	5,200,000
33	Arthritis deformans.	32	F.	21.0	11.9	56.7	....	....	....	..	..	..	70	4,000,000
43	Mediastinal gumma.	44	M.	21.7	12.3[1]	56.7	....	132–85	....	+	0	..	79	4,400,000
60	Gonorrheal arthritis.	27	M.	25.2	12.3	48.8	....	115–65	....	0	0	1.025	90	5,610,000
37	Chronic tonsillitis.	14	M.	25.3	11.2	44.3	....	140–70	....	0	0	..	87	5,400,000
51	Arthritis deformans.	42	F.	26.8	14.6	54.5	....							
2	Gout.	49	M.	27.2[1]	18.0[1]	66.2	....	....	....	0	0	1.026	90	4,100,000
54	Malarial cachexia.	41	M.	27.2	13.4	49.3	....	90–50	....	0	0	..	61	3,950,000
6	Tabes dorsalis.	50	M.	27.5[1]	16.6[1]	60.4	....	....	Optic atrophy.	0	0	1.019		
18	Acute lymphatic leukemia.	34	M.	29.1	21.1	72.5	....	115–55	....	+	0	1.013	25	1,570,000
7	Tabes dorsalis.	58	M.	29.2[1]	15.5[1]	53.1	....	....	Normal.	0	0	1.020	85	3,400,000
32	Chronic colitis.	37	M.	29.4[1]	—	..	....	116–65	....	0	0	1.025	86	5,700,000
8	Gout.	46	M.	32.9[1]	—	..	....	....	....	0	0	1.012	90	5,200,000
77	Sciatica.	29	M.	38.9	23.0	59.1	....	120–60	....	0	0	1.040	73	5,250,000
3	Tuberculous meningitis.	25	M.	40.0[1]	—	..	....	135–	....	+	0	1.029	..	5,350,000
80	Hypertrophic arthritis (knee)	52	M.	42.4	23.5[1]	55.6	....	122–70	....	+	0	1.021	80	4,900,000
	Group 2.—*a*													
42	Postinfluenzal myocarditis, generalized edema, hydrothorax.	25	M.	23.4	15.0	64.1	52	120-85	....	++	+	1.027	87	5,500,000
47	Adhesive pericarditis, general anascarca.	46	M.	26.0[1]	14.3[1]	55.0	....	105–60	....	+	+	1.027	84	5,100,000
79	Aortic insufficiency.	51	M.	26.0	15.8[1]	60.8	30 / 35 } 65	165–60	....	++	+	1.031	58	4,050,000
58	Aortic insufficiency (lues).	30	M.	31.3	—	..	....	140–68	....	+	+	1.015	73	3,910,000
9	Aortic insufficiency.	47	M.	33.7	22.2[1]	65.9	....	135–	....	0	0	1.021	95	4,300,000

[1] No duplicate estimations.

Group 2.—b

1	Aneurysm of aorta.	54	M.	26.0[1]	—	..	....	138–112	.....	0	0	1.018	..	4,300,000
53	Aneurysm of aorta.	54	M.	30.6	—	....	....	135–60	.....	+	+	..	66	3,950,000

c

75	Arteriosclerosis, auricular fibrillation	50	M.	30.0	15.6	52.0	8 / 30 } 38	150–90	.....	++	++	1.011	70	5,350,000
5	Hemiplegia, sarcomatosis.	63	M.	31.0[1]	17.5[1]	56.5	....	....	.....	+	0	1.023		
40	Arteriosclerosis, myocardial insufficiency.	67	M.	39.2	24.4	62.2	35	165–100	Early cataract; retinal sclerosis.	+	+	1.017	82	4,200,000
25	Arteriosclerosis, myocardial insufficiency, edema.	53	M.	25.1	—	..	....	190–130	Retinal sclerosis.	+	+	1.019		

Group 3.—a

35	Mitral stenosis, chronic parenchymatous nephritis.	18	M.	29.9	15.3[2]	51.2	35 / 28 } 63	138–100	.....	+++	+++	1.013	75	5,000,000
14	Congenital pulmonary stenosis, chronic parenchymatous nephritis.	20	M.	40.3	29.5	72.2	36	135–75	Normal.	+++	++	1.015	60	3,300,000

b

4	Chronic nephritis, chronic uremia, cardiac insufficiency.	50	M.	40.0[2]	15.0[2]	37.5	....	200–	Retinal sclerosis; old hemorrhage.	++	+	1.023	..	5,350,000
68	Chronic nephritis, arteriosclerosis, cardiac insufficiency.	59	M.	40.5	..	..	30 / 15 } 45	225–120	.....	++	+++	....	75	4,900,000

[1] No duplicate estimations.

Group 3.—b.—Continued

Serial No. of case.	Diagnosis.	Age in years.	Sex.	Total nitrogen in mg. per 100 c.c.	Urea nitrogen in mg. per 100 c.c.	Urea per cent.	Phthalein per cent., in 2 hrs.	Blood pressure.	Eye-grounds.	Albumin.	Casts.	Specific gravity.	Hemoglobin per cent.	Red-blood cells.
13	Chronic nephritis, uremic convulsions, podagra.	52	M.	41.6	28.9	69.5	....	225–	Retinal sclerosis; early optic atrophy.	+	+	1.010		
12	Chronic nephritis, arteriosclerosis.	56	M.	44.3	26.1	58.6	....	215–120	Retinal sclerosis.	++	++	1.009	98	6,700,000
11	Chronic nephritis, cardiac insufficiency.	59	M.	44.9	34.4	76.6	....	190–110	Normal.	+++	++	1.020	75	4,100,000
62	Chronic nephritis, arteriosclerosis, hemiplegia.	54	M.	53.4	33.3	61.8	28 / 9 } 34	215–120	.....	+	++	1.019	64	3,780,000
24	Chronic nephritis, chronic uremia.	50	M.	54.7	35.0	64.0	....	185–88	.....	+	+	1.010		
52	Chronic nephritis, retroperitoneal sarcoma.	54	M.	66.2[1]	42.4[1]	64.1	20 / 14 } 34	148–85	Retinal sclerosis.	++	++	1.025	69	3,800,000
48	Chronic nephritis.	61	F.	71.0	56.8	80.0	10	240–190	Neuroretinitis; hemorrhages.	++	++	1.009	54	4,700,000
39	Chronic nephritis, arteriosclerosis.	54	M.	82.3	59.9	72.8	2	215–110	Albuminuric retinitis.	+	++	1.013	75	4,500,000
34	Chronic nephritis, arteriosclerosis.	51	M.	103.5	82.1	79.3	1	145–85	Normal.	0	0	1.009	61	3,800,000
76	Chronic nephritis, gout.	48	M.	120.9[1]	93.9[1]	72.8	0 / 1 } 1	210–105	.....	++	(Pus)	1.012	32	2,500,000
							c							
17	Chronic nephritis.	35	M.	48.3	34.7	71.9	....	102–60	.....	+	+	1.017	..	3,100,000
23	Chronic nephritis, convulsions, pulmonary tuberculosis.	36	M.	48.4	34.2	70.7	....	195–	.....	++	+	1.016		
10	Chronic nephritis.	29	M.	50.0	34.3	68.6	....	102–55	.....	++	+	1.016		
44	Chronic nephritis.	35	M.	70.1[1]	63.0[1]	90.0	2	194–115	Normal.	++	++	..	57	3,400,000

[1] No duplicate estimations.

Group 3.—c.—Continued

41	Chronic nephritis.	32	M.	72.3	61.4	85.5	Trace.	210–135	Albuminuric retinitis.	+	+	1.010	33	2,600,000
49	Chronic nephritis, cardiac insufficiency.	36	F.	160.0[1]	136.0	85.1	Trace.	190–120	Normal.	+	0	1.010	41	2,600,000
31	Chronic nephritis, uremia, delirium tremens.	30	M.	181.0	144.0	79.9	....	95–58	Disk hazy, veins distended, retinal hemorrhages.	+	+	1.017	75	3,800,000

d

21	Acute nephritis.	15	M.	149.0	105.0[1]	70.4	....	132–95	.....	++	+++	1.021	74	3,700,000

e

63	Amyloid disease.	23	M.	99.0	..	..	Trace.	94–62	.....	++	++	1.013	49	3,580,000

Group 4

66	Syphilis (tertiary), anemia.	38	M.	20.1	12.4	61.7	....	100–60	.....	+	+	1.011	44	2,180,000
78	Acute cholecystitis.	29	M.	23.7	10.0[1]	42.2	8.5 / 22.5 } 31	165–95	.....	++	+	..	62	4,550,000
67	Atrophic cirrhosis. .	55	M.	23.8	6.9	29.0	....	126–82	.....	+	+	1.020	68	3,820,000
16	Coma (uremic?), death.	48	M.	27.9	13.5	48.4	....	165–105	.....	++	+			
56	Hypertrophic cirrhosis, delirium tremens.	36	M.	30.3	15.3[1]	50.5	15 / 5 } 20	145–70	Pallor of disk, distended veins, hemorrhage.	+	+	1.028	55	3,500,000
57	Acute bronchitis, transposition of viscera.	29	M.	30.5	19.4[1]	63.6	....	125–80	.....	+	+	1.013	81	4,730,000
36	Early nephritis.	48	M.	33.5	17.2	51.3	65	160–80	Normal.	+	+	1.013	83	5,000,000
61	Idiopathic epistaxis, secondary anemia.	24	M.	35.2	20.0	56.8	....	120–60	.....	+	+	1.023	64	3,780,000

[1]No duplicate estimations.

The cases of Subgroup 3, *c*, all belong to that type of nephritis in which pallor is a characteristic feature and which usually shows also puffiness beneath the eyes. The urine showed more or less albumin and, with the possible exception of Case 49, casts. In the two cases not showing blood-pressures well above normal, there was definite cardiac decompensation. With improvement in the general condition a marked rise of blood-pressure occurred. The three cases on which phthalein elimination was estimated showed an extremely low output. All the cases showed a non-protein nitrogen above 40 and an ammonia-urea percentage above 70. That there is a fixed relation between the degree of nitrogen retention and the prognosis cannot be claimed, since Case 31 with the highest degree of retention, under active treatment, improved rapidly. The uremic condition and the delirium tremens cleared up and later an examination of the blood showed a non-protein nitrogen of only 36. Subgroup 3, *d*, containing a single case, shows marked nitrogen retention.

Group 4 contains 8 cases in which nephritis may be suspected. In all the urine showed albumin and casts. In Case 56 the findings, as well as the low phthalein elimination, were possibly due to cardiac decompensation which complicated the condition at the time the observations were made. In Case 16 the diagnosis of uremia was based entirely on the data presented in the table. The patient died within an hour or two after admission, and no clinical history was obtained; an autopsy was not permitted. In the other cases some of the findings suggested a very early stage of nephritis. In none of the eight cases is there evidence of nitrogen retention.

From the foregoing result it appears that there is a definite tendency toward nitrogen retention in most cases of nephritis. This is apparently least marked in the so-called chronic parenchymatous nephritis in which the disturbance is one of fluid retention rather than of poor urea elimination. In the cases in which nitrogen retention is evident the higher percentage of the ammonia-urea fraction indicates that it is principally the excretion of this fraction that is impaired. The rapid fluctuations that we have

observed in two cases from which blood was repeatedly taken indicate that rapid variations in the concentration of the non-protein nitrogen of the blood may occur.

Mere passive congestion of the kidneys produces apparently albuminuria and even casts and causes some impairment in the elimination of phenolsulphonephthalein without producing a retention of non-protein nitrogen.

We have in this method an additional aid, and, we believe, a valuable one for ascertaining the state of activity of the kidneys. On the other hand, we are not warranted in inferring any constant relation between the existence or imminence of uremia and the degree of nitrogen retention. The existence of uremia without an increase in the non-protein nitrogen is, we believe, unlikely.

CONCLUSIONS

1. In a series of non-nephritic individuals the total non-protein nitrogen of the blood, determined by Folin's method, was found to lie between 15 and 43 milligrams per 100 cubic centimeters. From 50 to 60 per cent. of this was in the ammonia-urea fraction.

2. In cardiovascular disease with renal congestion, but without other renal lesion, there was no evidence of increase of non-protein nitrogen in the blood, nor of alteration of the ammonia-urea percentage.

3. In chronic nephritis with marked albuminuria and edema there was very little, if any, increase or alteration.

4. In chronic nephritis with hypertension the non-protein nitrogen was definitely increased, ranging from 40 to 180 milligrams per 100 cubic centimeters of blood. The percentage of the ammonia-urea fraction was usually higher than in non-nephritic cases.

5. Cases showing high non-protein nitrogen values were subject to rapid fluctuations in these values in the course of a few days. As a rule, clinical improvement was associated with a fall of the non-protein nitrogen figures to nearer the normal range.

6. Uremia was almost always accompanied by an increase of non-protein nitrogen in the blood, but no constant relation could

be established between the degree of increase and the tendency to uremia.

7. Our cases have not yet been followed for a long enough period to admit of conclusions as to the possible relation between the degree of non-protein nitrogen retention and ultimate prognosis.

8. We believe this method to be a valuable aid in the clinical study of nephritis and that it can be readily carried out in any well-equipped clinical laboratory.

PHYSICAL TRAINING IN THE PUBLIC SCHOOLS OF PHILADELPHIA.[1]

By WILLIAM A. STECHER, B.S.G.,
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THE OBJECTS OF SCHOOL GYMNASTICS.

Gymnastics, or physical training, is the regulated and supervised practice of muscular exercise, under conditions that tend to promote the health of the pupils, insure normal growth, and to develop and discipline their motor powers.

The aims of this training are twofold, namely: hygienic and educational; health-producing and habit-producing.

Viewed as to its physical effects, gymnastics produces health and hardiness. By combating and alleviating unhygienic school conditions, like impure air, bad light, improper sitting and standing, long periods of physical inactivity, it increases health. It cultivates and develops strength and it increases organic vigor. By increasing coördination, it promotes quickness and skill. It cultivates endurance, and strives for beauty of form. By its combination of strength and coördination, it produces beauty of motion—*i. e.*, grace.

Viewed as to its educational, habit-producing effects, school gymnastics promotes obedience, exactness, and order. It trains for alertness, quick perception, and quick reaction. It strengthens the will power. It awakens an appreciation of the beautiful in form and motion. In its competitive forms, it leads to self-control, self-denial, loyalty to leaders, and it awakens and promotes morality.

[1]Read by invitation June 4, 1913.

The gymnastic work in each grade is based on that of the preceding grades. For the elementary grades one complete set of exercises composed of sixteen lessons for each grade has been prepared by the director. For the grammar grades two complete sets have been prepared. These lessons are fully illustrated and are printed in the form of hand-books for the use of the class-room teacher. They comprise:

(*A*) Free exercises for schools that must exercise in the rooms; and

(*B*) Wand or dumb-bell exercises for schools that can use corridors, basements, or yards for their gymnastics.

Exercises with hand apparatus like wands, dumb-bells, and clubs have purposely been reserved for the grammar grades. While some exercises with hand apparatus might with perfect propriety be given in the lower grades, these hand-books make use of the educational principle that important facts, in order to be retained, should be presented to pupils often. Gymnastically this means that effective exercises and valuable coördinations should be presented to pupils repeatedly. This is done by using wands, dumb-bells, and clubs in the upper grades, so that valuable and effective movements may be used again, but in different forms.

THE LESSON SCHEME IN ALL HAND-BOOKS.

Gymnastics performed in class-rooms and corridors must of necessity be of a rather limited range, confining itself to calisthenics, rather simple dancing steps and tactics. Extensive running, hopping, and games can be introduced only in yard lessons. In yards that are suitably equipped, apparatus work and also track and field work is, therefore, taken as frequently as possible. During all lessons one must never lose sight of the fact that if the fifteen minutes devoted to gymnastics are to be of value to the pupils they must be filled by well-directed, vigorous work.

The arrangement of room lessons in the hand-books is as follows:

1. *Introductory movements* intended to bring about increased circulation and respiration in the shortest time.
2. *Exercises of the Head* having as their object (*a*) the strengthening of those muscles of the neck contributing to an improved carriage of the head, and (*b*) an increase of nervous control necessary to bring about an improved position of the head.
3. *Exercises of the Arms* whose chief aim is to strengthen the muscles of the shoulder girdle and to strengthen the arms.
4. *Exercises of the Trunk* having as their purpose (*a*) the strengthening of those trunk muscles conducing to an upright carriage, (*b*) an increase of nervous control necessary to achieve an improved posture, and (*c*) an increased mobility of the spine.
5. *Exercises of the Legs* devised to improve posture by strengthening the muscles of the trunk, as well as of the legs, and designed to give increased control so that an improved posture may easily be retained.
6. *Dancing Steps* with the intent, by the cultivation of general coördination, to increase skill, grace of motion, and beauty of posture.
7. *Tactics* used to arouse attention and to cultivate prompt response and ready obedience.

Place: Wherever possible the lessons in physical training is not to be given in the class-room. By preference the places for this work are (1) the schoolyard, (2) the corridors, halls or basements, (3) the school-rooms.

NOTE. Unless a room is very clean, the steps, as regular exercises are not performed in the class-room.

The conditions on the upper floors of old buildings often make it advisable to omit parts of the formal lessons. The exercises omitted under such conditions are practised when good weather allows classes to exercise in the yard.

Ventilation: Sufficient ventilation under all conditions is still an unsolved problem, even in most modern schools. In the greater number of school-rooms the quickest and most effective way of getting fresh air is to open the windows as often as conditions demand it. Naturally, outdoor temperature will determine

the time and the degree of this manner of ventilation. Manual work, singing, etc., increase respiration, and call for an increase of fresh air. Gymnastics does this to a still greater degree. Under no circumstances, therefore, are gymnastics to be performed in a room that does not give the pupils a greatly increased supply of fresh air.

The arrangement of a yard lesson is as follows:

1. *A Short Run.*
2. *Exercises of the Arms* (or Tactics).
3. *Exercises of the Trunk*
4. *Exercises in Hopping* (or Jumping, or Dancing Steps).
5. *A Game.*

The exercises for the arms and trunk, the dancing steps as well as the marching are taken from the lesson just being learned.

If a yard is equipped with gymnastic apparatus, this is used twice a week. A lesson there consists of:

1. *A Running Game of a vigorous type.*
2. *Apparatus Work.*

Time: Fifteen minutes daily are devoted to formal gymnastics. The Principals determine the time of the day the exercises are to be performed. The regular recess-time is not to be used for this work.

New Lessons: New lessons are begun every two weeks. There is a steady progression from the first to the eighth grade, also in the lessons of each grade. The coördinations of a lesson must, therefore, be well learned before those of a new lesson are attempted. After the new movements of a lesson have been learned the exercises of former lessons are often repeated. This gives a greater variety of movements, and also permit the coordinations of former lessons to be reviewed again.

At the time of tests or examinations no new work is attempted.

Supplementary Aids. The formal work as presented in the regular lessons is augmented by suitable yard games to be played at recess, and whenever possible, before and after school. A simple equipment of the schoolyard with gymnastic and play-

apparatus adds to the effectiveness of this part of the work. A further supplement to the work is an arrangement of "steps" (the so-called "fancy steps") as simple roundels which may be performed in corridors, halls or suitable basements after school or at other suitable hours to the accompaniment of music.

Recreation Drills: Prolonged sitting, even with most active brain work, will result in an increasing slowness of the blood-flow. This is followed by decreased power of attention and increased restlessness. The recreation drills are active means for combating these evils. A few minutes devoted to these drills is time well invested, resulting in increased mental freshness. Age of pupils, lack of ventilation and other school conditions may make it profitable for the teacher to use these relief measures every hour, or oftener. The time devoted to these recreation drills is not deducted from the time given to the formal lessons. These drills are composed mainly of exercises that vigorously work the large muscle-masses of the body. They are intended to counteract the detrimental effects of prolonged sitting or stooping. The selections are such that the exercises may be taken in any class-room. The windows are opened, and pupils standing near windows face these. If a class-room is favorably located a run of a minute's duration in the schoolyard—no attempt being made to keep step—also gives the desired relief, with the added benefit of more fresh air and changed surroundings.

The class-room teachers are admonished to distinguish clearly between the effects sought by the formal lessons, and the recreation drills, games, or roundels. The aims of the formal lessons are educational, demanding instant execution in the best form, when the command is given. The other work is recreative, allowing the greatest freedom to the pupils. For this reason it is advised not to use the regular formal lessons as a recreation drill.

Conscious, sustained effort is made to interest girls as well as boys to participate in all kinds of healthful outdoor activities suited to the seasons, like swimming, skating, tramping, etc.

During the last summer the Board maintained fourteen swimming centres for boys and girls of the schools.

Deep Breathing: If the regular exercises are taken vigorously and a reasonable number of times, deep breathing will be induced. Should an occasion present itself, especially when exercises are taken outdoors, deep breathing, with suitable arm or trunk movements, are practised as a separate exercise. In combining free exercises with deep breathing care is taken to inhale when exercises are performed that raise the chest, and to exhale when the walls of the chest are being compressed. Breathing never is suppressed during an exercise, as the more vigorous a movement is, the more will deep breathing be necessary.

The pupils' mouths must be closed while they are exercising or running. If a child cannot breathe through its nose the school physician is consulted.

Gymnastic Games: During favorable weather at least one-half of the time reserved for gymnastics is devoted to class games. As a rule they are played in the open air. A number of games suitable for the limited space in most school yards has been selected for each grade. If the class teachers do not understand those selected, the special teachers teach them.

In selecting games, teachers are advised to choose those requiring running or hopping, as they are of greater hygienic value than those of a quieter nature. Preference also is given to games actively employing many pupils at the same time.

Excuses: No pupil is permanently excused from gymnastics until a written excuse of the examining physician, stating definitely why the pupil should be excused, has been accepted by the Director of Physical Education. Principals send all such excuses to the director. Temporary excuses for sufficient reasons may be granted by principals or class teachers.

Personal Record Cards accompany the child through school. Whenever a teacher suspects a physical (or mental) defect this is reported to the medical inspector, who then gives the child a thorough physical examination. If it is thought advisable the child is then placed in a special class.

While the physical training work in the elementary schools is entirely in the hands of the regular class-room teachers, in the

high schools the gymnastic work is in charge of regular physical training teachers. For these there is no necessity for hand-books with definitely outlined lessons. For their guidance the Board of Education has adopted an outline course of study as follows:

Course of Study in Physical Training in the Boys' and Girls' High Schools, Philadelphia.

Part 1. Determining Principles.

I. The Aims of Physical Training.

The main aim of school gymnastics is to maintain and increase health, to develop and increase organic strength. Corrective work is a subdivision of this aim.

The second aim is to develop and increase skill, also courage, determination, and other mental qualities.

II. The Means.

1. The gymnastic means which the school can use to accomplish these aims are:

(*a*) Games; (*b*) Track and Field Work; (*c*) Free Exercises and Dancing Steps; (*d*) Apparatus Work; (*e*) Tactics.

2. According to their effects upon the body these means may be grouped as follows:

Group 1. As *Exercises of Endurance and Quickness*, like running, playing of games, dancing, swimming, tramping, rowing, sledding, skating, etc.

Group 2. As *Exercises of Skill and of Localized Strength*, like the free exercises without and with hand apparatus like wands, dumb-bells, clubs, etc., also exercises like vaulting, jumping, etc., or exercises upon apparatus like the horse, horizontal and parallel bars, booms, rings, ladders, etc.

Group 3. As *Exercises of Order*, marching exercises.

3. In accomplishing the aims outlined above the relative importance of the means are as follows:

(*a*) The *first place* is to be given to *Exercises of Endurance* and *Quickness, i. e.,* to exercises that have as their aims the increased mobility of the chest, sound heart and lungs, increased metabolism in the shortest time; namely, to exercises designed primarily for health and organic strength.

(*b*) The *second place* is to be given to *Exercises of Skill* and of *Localized Strength, i. e.,* to exercises whose aim is to increase coördination or to increase the strength of localized groups of muscles.

(*c*) The *third place* should be given to *Order Exercises.*

III. The Types of Lessons.

Whenever possible all gymnastic work should be done outdoors. Even the best ventilated and cleanest gymnasium is an indifferent substitute for the open air. The gymnasium is useful mainly in inclement weather.

The following types of lessons show the approximate time to be given to the different units of work. A lesson is supposed to last forty-five minutes.

Type No. 1. Outdoor.

1. Exercises of endurance and quickness, thirty minutes.
2. Exercises of skill and localized strength, fifteen minutes.
3. Order exercises (not necessary in every lesson), five minutes.

Type No. 2. Indoor.

1. Exercises of endurance and quickness, twenty-five minutes.
2. Exercises of skill and localized strength, twenty minutes.
3. Order exercises (not necessary in every lesson), five minutes.

The time and the arrangement of the different parts of a gymnastic lesson lasting forty-five minutes would be approximately as follows:

1. (*a*) Running, two to four minutes; (*b*) Dancing steps, eight to twelve minutes;
2. Free exercises, six to eight minutes;
3. Apparatus work, or track and field work, ten to twelve minutes;
4. Games, ten to twelve minutes;
5. Tactics (not in every lesson), two to four minutes.

In boys' classes the time specified for dancing steps will often be used for apparatus work, or track and field work.

Many dancing steps can be executed alternately with free exercises, and in the same class-formation.

IV. Aims of the Types of Movement Classed Under the Different Groups.

In all exercises good form is of the greatest importance.

Group No. 1. *Exercises of Endurance and Quickness.*

Running, both as a simple exercise and in games, is of the utmost importance in quickly increasing circulation and respiration, of developing heart and lungs, of increasing mobility of the chest.

If dancing steps are taken instead of running, they must be of a vigorous type, to induce strong action of the heart and lungs. Games, to come under this head, must also be of the vigorous type having much movement of the whole body.

While it may appear difficult to influence swimming, tramping, sledding, rowing, skating, etc., it must, nevertheless, be the aim of teachers of physical training to get their pupils to indulge in these forms of natural exercise. Pupils should also be encouraged to play highly organized games. This may be done by the formation of permanent teams and clubs, and by the preparation of

schedules for play or any other activity after the regular hours of school, on Saturdays and on holidays.

Group No. 2. Exercises of Skill and Localized Strength.

The free exercises (calisthenics) come under this head. For high school boys, especially, they should be taken with light iron wands, iron dumb-bells, or with clubs, so as to increase their effectiveness. Exercises for the muscles of the trunk must predominate. Whenever possible all movements of this kind should first be taken upon command and then in rhythm (in time, in series). When taken upon command, wherever practicable they should be combined with breathing exercises. Whenever exercises have been well learned and are appropriate, they should be performed to music.

Most forms of field work, also the exercises upon fixed apparatus, belong to this group. (Track events like running belong to Group No. 1.) Exercises must be selected which keep as many pupils as possible employed at the same time. The object is to secure skill and correctness of execution, and to strengthen certain rather well-defined groups of muscles. Many of these exercises are admirable to develop courage, determination, presence of mind, and like mental qualities.

Group No. 3. Order Exercises.

Tactics should be used to accustom the class to prompt obedience and to coöperative action. They have no value for physical development.

V. General Notes.

1. As a rule, pupils of the same grade should be grouped in a class. This class should then be divided into at least two divisions, based upon physical fitness.

2. Classes composed of pupils of different grades must be divided into several groups, based upon previous instruction and upon physical fitness. Successful teaching in subdivided classes, also in all kinds of team work, is conditioned on com-

petent leaders. Promising pupils should be selected and given separate instruction, and developed as a class of leaders. With competent leaders, enough subdivisions may be made to accommodate pupils of many degrees of physical development.

3. As soon as a good coördination has been developed and the class aims reached, it is wise not only to allow, but to encourage pupils to invent suitable exercises and combinations (chosen exercises) on all pieces of apparatus.

4. At suitable time during a lesson attention should be called to the effect of particular exercises. The physical training period also lends itself well to appropriate instruction in personal, school, and community hygiene. This opportunity should constantly be used—but with discretion.

5. While the class aims for boys and girls are practically alike there should be a great difference in the method of teaching gymnastics to the two sexes. Any instruction, mental as well as physical, which with girls interferes with the menstrual period is of evil and should cease.

6. In general the differences between the work of boys and girls are as follows:

(*a*) For girls more weight should be placed upon dancing steps and upon corrective work.

(*b*) In the track and field work, the apparatus work, and also in the games, the physical work demanded of girls should not be as great as that required of boys.

(*c*) For girls there should be little competitive track and field work, also few strenuous games, both forms to be limited, as a rule, to intra-class and intra-school competitions.

(*d*) For boys there should be a gradually increasing amount of competition in track and field work, in apparatus work, and also in games. This competition is to be chiefly intra-class and intra-school, and only exceptionally shall it be with outer-school teams.

7. By action of the Board of Public Education all athletic work in the high and elementary schools is placed under the direction of a Supervisory Committee on Athletics, the chairman of which is the director of physical education.

THE WISDOM OF HEALTH AS TAUGHT IN A GREAT UNIVERSITY[1]

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When a university undertakes to occupy the last four years of a boy's growing life she must first take into account his physical condition as well as his mental acquirements and should safeguard his health and educate his physical powers with as much accuracy and intelligence as is exercised in the rest of his college work.

At the University of Pennsylvania every man when he registers at the bursar's office for the first time receives an appointment card for physical and medical examination. After filling in a blank referring to his past health and habits he takes a shower bath and reports at the physical director's office. When the tape-line has recorded his length, breadth, and thickness, and after he has pushed, pulled, grasped, and lifted his best he is placed standing upright with feet together and his posture and figure are examined. By an arrangement of mirrors he can see his own back for the first time without moving. The flat chest, uneven shoulders, lateral curvature, are at once evident to him. The broken-down arch that has given pains to the feet is easily demonstrated and ambition for better things is awakened in his breast. He is then put under treatment which runs in concord with his college course. After this inspection he lies down on a couch for further examination of the heart and lungs, and a test of the hearing of each ear. On leaving the room he gets a card which he takes to the swimming

[1] Read June 4, 1913.

instructor. If he cannot swim the length of the hundred-foot pool he is put under instruction, for every man must learn during his first year to take care of himself in the water. Last year 340 men were taught this necessary art, the rest having passed the test on entering. In the last eight years nearly three thousand men have been taught to swim.

Men having physical defects are given cards on which are printed lists of exercises suitable for every case. These are taken to the instructor on the gynasium floor, who demonstrates the movements and repeats them .until the student has mastered them. Like the horse of the story a man may drink or not after this according to his thirst for physical perfection, but he has at least been led to the water. The treatment of graver disabilities that are not within the thousand or more young men is a different matter. A man who shows an involvement of the lungs has his whole future at stake, and his relation to the college community must also be considered. If the trouble is slight he is put under observation and treated by a specially appointed college physician if he is in residence and away from home. If he lives at home his family is informed that he must be put under treatment at once. By this kind of care he usually gains rapidly in weight and often throws off the infection with little or no interference to his college work, whereas if he neglected he would have to leave college a sick or dying man after a losing struggle of a year or more. Gains of from ten to fifteen pounds and disappearance of symptoms after a few weeks open-air sleeping and prescribed feeding are frequently reported. About forty in one thousand men show some serious disturbance in the circulation, from irregularity of pulse to structural damage of the heart. These men must be protected from physical overstrain. They must be taught to nurse their physical resources and to take only such exercise as will build up their resistance. The squandering of their future in the fierce competition of athletics is forbidden. Every candidate for an athletic team must show a certificate of physical soundness given after examination each year when he reports for an athletic team or squad. It is on the basis of these examinations that the director regulates

the physical life of the Pennsylvania student. He may prescribe very light individual exercise given personally by instructors, or he may allow him to elect foot ball, base ball, basket ball, swimming, rowing, fencing, boxing, wrestling soccer, tennis, cricket, or golf, credit for his attendance being given during the time he is actively engaged on each squad. Whatever form of sport he may choose or whatever form of exercise may be allotted to him he must account to the University for two hours a week taken under the direction of the department unless excused by the director himself.

Two things a student frequently questions: (first) his right to take part in any sport whether he injures himself or not. He must frequently be convinced that in case of injury his friends and relatives must be considered as well as the reputation of the University, part of whose duty is to bring him through college stronger and better than when he entered, instead of preparing him to spend the rest of his days nursing his increasing ailments. The second question is why he should spend two hours a week of a crowded roster of what at first seems to be something apart from his college duties. Fresh from his summer holidays he feels able to work twenty-four hours a day. The necessity of a corrective for a comparatively sedentary life must be explained, and the possibility of educating his rapidly maturing physical powers must be impressed upon him. It has frequently been a pleasing experience to have students, who at first object, to come in at the end of the term and thank the director for his insistence. The examination of the eyes which is conducted under the Department of Physical Education by an expert ophthalmologist with a number of trained assistants, takes place early in the term. A brief history of the sight is taken and the student is examined for distant vision, close vision, and muscular balance. The appearance of the eye-ground is seen through the ophthalmoscope. After the examination he receives one of three letters stating that (1) his eyes are all right; (2) that they require attention and should be given at the first leisure moment; (3) that they should have immediate attention to enable him to go on properly with his course.

One is tempted to quote statistics of the sudden cure of headaches and relief from other disabilities as well as the discovery of unsuspected defects and leaks of efficiency that have been stopped by this means. It is not difficult to pick isolated cases of striking improvement under this system and there is nothing dramatic about the raising of a general average. Yet this is the aim for which the department works.

By taking the entire class of 1909 through their four years of college life and comparing their measurements on entering and on graduation we can show an average increase of one inch in height, of seven pounds in weight, and three inches in expanded chest. The raising of a whole student community so much means the application of a strong lever, for the normal increase of these items between the age of entering and graduation does not count for 5 per cent. of it; and the progressive physical training must be held accountable for most of the rest of it. There is, however, the increased skill and education of the physical powers which can neither be measured nor weighed.

When the student comes out in his gymnasium suit on the floor of the gymnasium for his first year's course he finds himself confronted by a problem which is going to determine his place, Groups I, II, III. He has to circle a bar, jump 3 ft. 6 in. high, climb a rope hand over hand 18 ft. high, in which tests about 50 per cent. fail. Exercise follows to educate this power, and after ten lessons on each piece of gymnastic apparatus he comes out with at least a bowing acquaintance of the particular form of activity for which it was designed; in fact about 90 per cent. are able to pass the tests after their first ten lessons.

To most college men time is valuable and the brisk half-hour twice a week ending with a shower or plunge in the swimming pool is enough at least to keep them aware that they are physically alive. But the average youth soon reaches out for new fields to conquer in the world of achievement and he graduates into an athletic squad as a matter of course. While the risks of athletics to life and future usefulness have been grossly exaggerated, as proved by statistics so carefully collected by Morgan, Meylan,

Anderson, Hammett, and others, there are some men to whom violent competition should be closed and there are still others who should be under medical supervision throughout their entire course.

There are two college physicians at Pennsylvania with a corps of assistants, and the University Hospital forms the centre around which the other buildings cluster like a crescent, while in the centre of the hospital is the students' ward. Their fourteen beds are seldom empty. These cases receive the attention of the professor of medicine in his daily rounds, and most of the beds are endowed by friends and relatives of those who have found them a haven of refuge during their college days. In an institution so large as Pennsylvania with its 5000 men the danger of an epidemic must always be present in the minds of the University Committee on Hygiene and the members of the medical staff, and the least suspicion as to a throat or a rash or a high temperature means isolation until the question of contagion is beyond doubt. Fortunately no bad epidemic has got headway, although many have been averted by quick action of the physician in charge and the Department to Hygiene. The Committee on Hygiene consists of a chairman, Dr. J. William White, a trustee and emeritus professor of surgery, the provost ex-officio, the professor of hygiene, the professor of physical education, and the professor of medicine. It occupies itself with the general questions of student life, the sanitary condition of the dormitories, and the sterilization of water in the swimming pool, and the isolation of contagious cases. Another occupies itself with the inspection of boarding houses which are approved by the University, and in this way the University of Pennsylvania tries to provide for the physical education, sanitation, and general health of its student body.

DISCUSSION

Dr. G. E. de Schweinitz: It occurs to me that inasmuch as we have heard these very interesting papers referring to the value of physical exercise in the development of seeing children and young persons, it may be of some interest to tell briefly how large a factor such exercise is in the education of blind children. I refer especially to the work at the Overbrook School. If the avenue of sight is cut off, one of the chief means of becoming acquainted with the objects which exist in the external world is obliterated, and the visual centre being insensitive, it becomes necessary to train other centres to take the place of the inactive centre of vision, to enable it, in other words, as has been stated, to perform its associated if not its primary function.

Certain things must be remembered: First, that blind children are at least two years behind seeing children of identical age; that the loss of any special sense of itself does not improve remaining senses; indeed, it is probable that the loss of sight tends to make other senses less sensitive; and finally, that a blind child is lacking in the self-independence, and self-reliance, and in the power of initiative, because, as has been well said, blind children having lost the main agent of observation, their powers of abservation are small and they must be reached chiefly through their motor centres.

Now the faults already named, and especially the fault of overcautiousness, can be corrected among blind children best by stimulating in them a love of activity in athletic sports. I will mention three types—swimming, running, and bowling. Once the blind child has been taught the swimming stroke and thereby has gained sufficient confidence to keep afloat in the pool, he soons learns all of the joy of this sport, learns, for example, the sense of direction by listening to the call of the trainer's voice, or the cry of some companion who pretends to be drowning, and it is a wonderful sight to see blind children plunge into the pool and make a rescue in circumstances like these.

Accuracy and precision are secured in the bowling alley, and, be it understood, totally blind children learn to bowl even better than children who see a little, because the child who has only a little sight learns to depend upon this, and therefore the tactile sense is never developed by this form of exercise as it is in the totally blind child. Blind children become exceedingly expert bowlers.

The blind runner guides himself by holding on to a wooden handle attached by a short flexible chain to a ring or a long piece of wire. The ring slips as he runs along, and by feeling and by sound, for instance,

the sound of the trainer's voice, he maintains his course. As Mr. Bishop puts it, this form of exercise increases the blind boy's physical courage as well as his confidence.

It is unnecessary to multiply examples, although I might tell of how blind children become clever roller skaters, and learn with great precision the minute their feet pass beyond the confines of the floor on which they skate, the edges of which for a foot in width are made of a material slightly different from the main body of the floor. You can readily understand how in this exercise sense of direction, tactile sense, and sense of position are developed.

If time permitted, I might go on and tell you how the fundamental muscles are brought into proper training and later the finer accessory muscles, like those of the hands and of the fingers, as has been so well shown by Mr. G. Stanley Hall. You can readily understand when this has been accomplished there is gradual preparation for such occupations as typewriting, writing and the like, and gradually the receptivity of the brain centres increases, physical courage and confidence are elevated, and these children can take their places with seeing children in the schools of the day. You follow the thought, I am sure, and you observe how important athletics and physical culture are in the development of blind children; indeed, they are one of the most important measures whereby blindness has been circumvented.

Dr. J. M. Anders: I am quite sure that every Fellow of the College present, feels indebted to Professors Stecher and McKenzie for having presented the subject of physical education in such an instructive manner. It is clear to my mind that the work of physical education in the public schools, colleges, and universities has been carried farther than has been supposed by the majority of physicians of Philadelphia. Speaking for myself, I was not aware of the fact that the lessons in physical training in our public schools were so carefully graded as was indicated by the remarks of Professor Stecher. This I take it is a very important feature of the work. It is obvious to my mind that physical training as carried on in our public schools, colleges, and universities is well calculated to improve the physical stamina of the rising generation, particularly if the supplemental work to which Professor Stecher alluded be considered. Compared with the time devoted to the mental training of the child and student, however, it must be obvious to us as physicians that too little attention is still paid to physical education. Besides the physical effects of the exercises as indicated by the speakers, there are certain educational advantages which to my mind are of the greatest possible value. The child in school, or the student at college, is thus taught the habit of muscular exercise. The point should be emphasized that this habit should be

maintained in after life. The value of good ventilation and discipline is also incidentally learned in connection with the subject of physical exercise. Whether considered from the stand-point of the public school or of the college, the subject is one that should interest in a special manner the medical profession. It is incumbent upon the medical profession to interest itself in the matter of competitive sports and to warn against those which are injurious. The medical profession has long since concluded that prevention is better than cure and also more humane, but it has been slow to emphasize the importance of muscular development which is synonomous with physical development as a factor in that program of prevention of disease.

Dr. James C. Wilson: Isolation stands much in the way of progress, and it is a very good thing that the Fellows of this College have had the opportunity of hearing this evening the statements made by specialists working in lines germane to medical work, yet very little appreciated and understood by the medical profession at large. I fully concur with the opinions expressed as to the importance of physical training in public school and university education and as to the value of the papers presented to the College on this occasion. The Committee on Public Health and Preventive Medicine, which is a new body among the standing committee of the College, is entitled, together with the Committee on Scientific Business, to great credit for arranging the subjects for this meeting.

Dr. John A. McGlinn: I should like to ask Dr. McKenzie what was the effect of the physical exercise on the student body as to smoking or the taking of alcohol. In college the men taking part in athletics, in the time of training, did not smoke or drink, but after the training season was over went back to smoking. A man cannot do justice to himself if he smokes during the time of training. I wondered whether the exercise had any particular influence in reference to the habits of students before entering college at the time of taking the physical exercises.

Dr. Stecher: Mr. Chairman and Fellows of the College of Physicians: I do not know that it is necessary for me to emphasize the part brought out by Dr. Anders, because it is just the forming of correct habits of exercise that we are striving for. The majority of school men appear to believe that the formal work is the main work. It is not, because it is corrective, and, as a rule, children are not interested in it. They are interested in the swimming, walking, games, etc. We are, therefore, placing greater emphasis on these forms of physical training, although a number of educators do not favor them. Girls take to dancing like a duck takes to water. It is not the dancing that is bad, but the present form of dancing. Dancing is one of the finest forms of physical exercise

we have. It is something we should teach. Physical training, however, is no more responsible for the present forms of dancing than we are for the modern dresses the women wear.

Dr. McKenzie, closes: There have been two investigations made upon the matter of smoking in connection with physical exercise and health, one at Yale and one at Columbia. The more reliable was that made at Columbia because there it was gone into more exhaustively. The conclusion as to the general effect of smoking was that it was almost negligible on the general health. It was very difficult to disentangle the effect of smoking from that of other causes. It was investigated from the standpoint of scholarship. The scholarship was slightly lower among smokers. The health record did not seem to show any appreciable difference. There is no doubt that during training smoking interferes with condition. Tobacco is a depressant and an irritant to the mucous membrane.

I was very much pleased with the remarks of Dr. de Schweinitz and at the beautiful way in which he told of the work among blind children. I have been interested in them, too, and it has been an unceasing marvel to me how these boys and girls go into the swimming pool and swim and find the direction as he has described. One thing about blind children I have never been able to fathom, and that is how these children will play bat and ball. They will play for hours with the greatest possible interest without ever hitting or catching the ball. It may be one of those cases of "the triumph of hope over experience," like the game of golf.

SYMPOSIUM ON MEDICINE IN SURGERY

MEDICAL DIAGNOSIS IN RELATION TO SURGERY[1]

By DAVID RIESMAN, M.D.

The domain of surgery has been so widened in our own time that there is scarcely a medical condition that may not in some of its phases become a surgical one. By the very vastness of his field has the surgeon been forced to specialize and to devote himself exclusively to the eye, the ear, the nose, and throat, the genito-urinary tract, or the female genital organs. The advantages of such a distributive process are many, and are too well known to be reiterated here. But there are some incidental disadvantages. At first sight these might seem to have nothing to do with my present theme. There is, however, a very logical connection. We find the laity no longer consult their family physician for their well-defined regional complaints; instead they go directly to the ophthalmologist, otologist, laryngologist, etc., who, if he finds an operative condition, proceeds in the majority of cases to deal with it surgically. Not all will deem it necessary or important to have a medical examination made, a neglect that may jeopardize the patient's life.

Medical diagnosis to my mind involves not only the recognition of the existence of a surgical condition, but also a careful study of the patient as a surgical risk. No surgical operation requiring anesthesia should be done without the approval of a medical man, based upon a thorough examination of the patient. Such an examination involves a study of the heart, the blood-

[1] Read October 1, 1913.

pressure, the temperature, the lungs, the kidneys, the blood, and the psychic and nervous systems. The results of his findings, insofar as they may affect the operation and its before- and after-treatment, the physician should communicate to the surgeon and together they should weigh the patient's status. But while I hold that no operation should be done without the coöperative study of a competent medical man, I also believe that no surgeon should ever operate solely on a medical man's opinion. He should on his own account study the case from the broadest aspect and arrive at an independent judgment. If the two men cannot agree, then a colleague of proper standing should be called as an arbiter. Cases will, of course, arise in which a determined surgeon, in sole charge of a patient, will operate with the whole faculty against him, or in which the medical man, having the patient's life primarily in his keeping, will refuse consent to an operation that all the surgeons hold imperative. Such cases, however, do not alter the fact that the *modus operandi* I have sketched is, both for the patient and for the fair name of medicine, most desirable.

Coming now to the specific topic I have chosen, I am overwhelmed with the immensity of the subject of the medical diagnosis of conditions surgical. It appears to me of some advantage to have a working classification and to give to this a regional basis. A further advantage is obtainable by lopping off all consideration of things that are obvious. There are a number of conditions the surgical treatment of which does not admit of a difference of opinion—such as strangulated hernia, division of a large bloodvessel, fractures, dislocations, impaction of foreign bodies in the air passages; these need not detain us. Yet it might not be amiss to point out one or two possible errors in diagnosis. Thus I once saw a woman supposed to be suffering from neuritis of the brachial plexus in whom I discovered a dislocation of the humerus. And further, in a study of cervical rib made several years ago, I found that this condition may lead to the diagnosis of aneurysm of the subclavian artery and of neuritis. A correct diagnosis would render possible a cure by surgical means.

Beginning with the head, medical diagnosis concerns itself with such surgical and quasi-surgical conditions as fractures, tumor, abscess, and meningitis. In many respects the first is the most important, inasmuch as where alcoholism coexists the fracture may be overlooked. Not a few young internes have made this grievous mistake and have perhaps sacrificed a life, and incidentally brought discredit upon themselves and their hospital. I have always taught that no obviously alcoholic patient should be sent from the hospital if he presented one of two conditions—a very rapid or an unnaturally slow pulse. The former might indicate a dangerous weakness of the circulation, the latter cerebral compression.

The medical diagnosis of tumor need not be discussed in detail. There is but one point I desire to emphasize, viz., that uremia may in every way simulate tumor of the brain, and without the guiding hand of a clinician, a useless and probably fatal operation may be done.

Abscess of the brain most often springs from middle-ear disease. As the history is not always definite and as the patient is not rarely seen in a stuporous state, the ears and mastoid processes should always be examined in every obscure "head case." A history of chronic ear trouble and intense, uncontrollable headache should arouse suspicion.

Meningitis of the suppurative type is, thanks to Irving Haines, now being claimed, somewhat furtively as yet, by the surgeon as his domain. Hence the medical man must be prepared to diagnose it as early as possible. Intense headache, rigidity of the neck, Kernig's sign, the character of the spinal fluid after lumbar puncture, are the signs and symptoms leading to a correct diagnosis.

In the neck the principal disease to interest us is exophthalmic goiter. No disease is more easily recognized, and yet he who does not see it at once may remain blind to it despite its obviousness until someone else points it out. The medical man is called upon to diagnose the disease, the cardinal symptoms of which are too well known to need mentioning here, and at the same time to determine whether the patient is in an operative state, assuming

that an operation is contemplated. He will advise against operation if the patient is highly thyrotoxic, has pronounced tachycardia, enlarged heart, slight fever, gastric symptoms, and psychic exaltation.

In the case of lymphatic enlargements in the neck the physician has to determine whether they are tuberculous, leukemic, or due to Hodgkin's disease. A blood examination will reveal the second, but is of little help in differentiating between the other two. The hard character of the enlargement and the presence of glandular masses elsewhere is in favor of the latter. It should also be remembered that sometimes spinal symptoms are an early manifestation of Hodgkin's disease.

A word might be said about the status lymphaticus. If it can be proved that death in this condition is due to compression of the trachea by the enlarged thymus, then the medical man should know how to diagnose it speedily so that the surgeon may be called in time. The age of the patient, cyanosis, inspiratory dyspnea, dulness over the manubrium, and perhaps a laryngeal examination are aids to prompt diagnosis.

In the chest the diagnostic problems of surgical conditions are few and not very troublesome. Most important is empyema. As far as its diagnosis is concerned, it should always be thought of in children suffering from fever with marked sweating and anemia. It should furthermore be borne in mind that it may be a terminal condition in the aged, manifesting itself only by fever and slight dyspnea. Between these extremes a diagnosis is rendered somewhat easier if a history of preceding pneumonia is obtainable. There are, however, rare instances in which empyema seems to be there from the beginning. It then simulates pneumonia very closely.

If the empyema is interlobar, the symptoms will suggest the presence of pus, but the physical signs may fail to reveal its location; localized tenderness may act as the divining rod.

If the medical man has located the pus by means of the exploring needle, the surgeon in operating should make his incision at the same place, no matter whether the spot is best from a

surgical point of view or not. I have seen a surgeon, for the purpose of getting better drainage, disregard the point of puncture and fail to find the pus. Sometimes with very marked symptoms only a spoonful of pus is found, and this may be missed if the operator does not follow the point of original entry.

When empyema has been diagnosed in an adult and the history reveals no previous chest condition, the possibility that the pus may be below the diaphragm should be envisaged. Depression of the liver dulness, a patch of tympany, data suggesting the existence of an old gastric ulcer or appendicitis, together with a radiographic examination will usually determine a subphrenic abscess. Exploratory puncture should be made with a needle of large caliber. It will demonstrate the presence of offensive "colon" pus and perhaps gas.

Abscess and gangrene of the lungs are rare; diagnosis is far less difficult than localization. The *x*-ray is very helpful but may mislead us as to depth and height. The other signs and symptoms hardly need discussing.

The surgical conditions involving the heart are chiefly two: mediastinopericarditis and pericardial effusion. The operation for the former—cardiolysis—is still on trial, so that the medical diagnosis does not greatly interest the surgeon. Pericardial effusion is usually overlooked, more often, I think, than any other disease. The operation for paracentesis is done as often by the medical man as by the surgeon, but when the fluid is purulent the latter should be called in to establish drainage. I need not dwell on the diagnosis except to say that pericardial effusion may be mistaken for pneumonia. I have seen one case that might have been saved had the proper diagnosis been made.

A curious diagnostic error in connection with disease of the heart has come to my notice two or three times, and as it has a surgical interest I will cite one case. A patient had a large, tender, epigastric swelling, vomiting, anorexia, and great prostration. The surgeon to whom he had been referred, diagnosed a gastric carcinoma and decided to operate, but before doing so wanted a medical opinion. This opinion was "mitral stenosis,

loss of compensation, enlargement of the left lobe of the liver, and congestion of the stomach."

In the diagnosis of surgical conditions of the abdomen, it is of practical advantage to treat separately what English and American writers call the acute abdomen. Many conditions are not grave and demand medical treatment only, such as acute indigestion, ptomaine poisoning, so-called, and lead colic. But a careful examination and especially a good history are always necessary or mistakes will be made. Assuming that the case is one of considerable severity—then, having ruled out error in diet as the cause, the first question should be, Is the trouble really in the abdomen or is it in the chest? A few months ago I was asked to see a man who was about to be placed on the table to be operated upon for appendicitis. The expert anesthetist, upon making a cursory examination, had grown a little suspicious of the heart and had demurred taking the responsibility of administering ether without the support of a medical opinion. Study of the case forced me to the conclusion that the man had lobar pneumonia and not appendicitis. The diagnosis was confirmed by subsequent events. This is not the only experience of the kind that I have had, but in none did operation hover so close. I am inclined to think that too much stress is laid upon vomiting. If the initial chill of pneumonia follows hard upon a heavy meal, whether the patient is an adult or a child, vomiting is likely to occur.

Not only appendicitis but gall-stone colic, acute pancreatitis, perforation of a gastric or duodenal ulcer, may be simulated by chest conditions. Hence before definitively diagnosing any one of these the chest must be carefully explored. The laity, ignorant of the tribulations of the doctor, would never forgive an error in diagnosis that involved an abdominal operation for a thoracic disease, but we who know how one may mimic the other should be sparing in our criticism.

In the diagnosis of other conditions causing the acute abdomen, the history is of incontestable value. The age of the patient, previous attacks of pain, leukocytosis, may determine the

diagnosis of appendicitis. It is indeed a fair assumption that acute inflammatory conditions of the abdomen during adolescence are of appendiceal origin, quite regardless of the area of greatest pain; the greatest *tenderness* is usually found on the right side.

In women the most important acute abdominal conditions to bear in mind, aside from appendicitis, are ruptured extrauterine pregnancy and torsion of an ovarian cyst. The former is not difficult of diagnosis. The history may help, but does not always do so; pallor, sighing inspiration, abdominal dulness, and vaginal examination establish the diagnosis. Torsion of an ovarian cyst I have met four times. In none of the cases had there been any previous knowledge of the existence of the cyst or of any pelvic trouble whatsoever. Illustrative of the importance of medical diagnosis I may say that in the first case a diagnosis of uremia had been made by the attending physician on account of uncontrollable vomiting, there having been no other definite abdominal symptoms.

Acute conditions of the abdomen also arouse the suspicion of rupture of an ulcer of the stomach or duodenum. As prompt recognition is here of the greatest importance, I will dwell for a moment on the diagnostic features.

Perforation in duodenal ulcer is usually an extremely sudden process. It causes at once intense pain and collapse, which may be followed in a little while by a temporary lull in the symptoms. This lull, which is probably caused by the non-irritant character of the duodenal contents, is very deceptive and may lead to errors in diagnosis. The pain is usually in the epigastrium, but may be in the appendix region; the abdomen has a board-like hardness. In the final diagnosis the history is of the greatest importance; a history of periods of disturbed digestion with pain (hunger pain), especially nocturnal, alternating with periods of good health. The male sex, as is now well known, predominates in duodenal ulcer.

Empyema of the gall-bladder may set in with acute or "stormy" symptoms, to use a Teutonic idiom, and may be diagnosed as

ruptured gastric ulcer. The diagnostic points upon which I would lay stress are the history of previous attacks of colicky pain, good health in the intervals, tenderness in the gall-bladder region, and fever. Sometimes the gall-bladder can be felt if very light pressure with the warmed hand is made.

Another acute condition requiring a skilled medical diagnosis is acute pancreatitis. The symptoms of that are not characteristic. They may be interpreted as ruptured ulcer or empyema of the gall-bladder or intestinal obstruction. Perhaps the most valuable guide to correct diagnosis is to have pancreatitis in one's *arrière pensée*. Many difficult conditions, as Charcot remarked long ago, are happily diagnosed by merely thinking of them. If there is a history of gall-stones, the diagnosis of pancreatitis is greatly strengthened.

A rather peculiar diagnostic difficulty came under my notice last year. A surgeon asked me to see an old lady suffering from intense pain in the right upper quadrant of the abdomen. It was doubtful whether the trouble was in the gall-bladder or in the right kidney. Careful examination showed an erythema following the intercostal nerves and extending across the right upper abdomen. There were no vesicles, but it seemed so much like a herpes zoster that I ventured upon that diagnosis. Within a day or two the characteristic vesiculation appeared. Dr. Lawrence Litchfield, of Pittsburg, has recently reported several similar cases.

I have not exhausted the acute abdominal diseases, but time does not permit me to include all of them. A word, however, about perforation in typhoid fever. Few conditions impose such a heavy responsibility upon the doctor. If he could be sure, his course would be easy, but the diagnosis is not as simple as some writers claim. A sudden pain, slight leukocytosis, rise in the pulse rate and temperature are nearly sufficient for diagnosis.

Coming now to the consideration of more chronic conditions, we find that one of the most difficult tasks is the proper interpretation of the functional disturbances of digestion. Which are

and which are not amenable to surgical treatment? Though the work of surgeons like the Mayos, Moynihan, Deaver, and Robson has greatly clarified this subject, it still remains one of great perplexity. The too enthusiastic abdominal surgeon, seeing a few cases of dyspepsia and hyperchlorhydria associated with gastroduodenal ulceration, concludes that all such cases have a similar basis. I believe that hyperchlorhydria may be a purely functional condition. Even hunger pain and hyperchlorhydria are not infallible signs of duodenal ulcer. Yet if the patient so suffering is a man and in every way a fit surgical risk, we are probably justified in advising an operation on the assumption that the cause of his trouble is duodenal ulcer. The *x*-ray in skilful hands is of great diagnostic value, showing in these cases a hypermotility of the stomach with rapid propulsion of the bismuth meal into the duodenum. In every case of so-called gastric neurasthenia or nervous dyspepsia, characterized by bloating, eructation of gas, a variable appetite, and nervous depression, an organic basis should be suspected. Often it is gall-stones; sometimes it is appendiceal adhesions. A correct diagnosis is impossible without a careful history and a thorough physical examination, particularly a search for Mayo-Robson's tender point. We must not be misled by left-sided pain, for just as appendicitis may sometimes cause pain on the opposite side, so may gall-stones, especially when there are adhesions between the gall-bladder and the stomach.

The subject of splanchnoptosis is one of great interest at this time. Its relation to chronic ill health and to constipation make correct diagnosis and proper treatment a pious desideratum. I have not been convinced that surgery is the only way to success, and believe that the admirable work of Coffey, of Portland, Maine, has demonstrated that much can be accomplished by purely medical means.

As a matter of medico-surgical interest, I should not omit to mention the fact that the gastric crises of locomotor ataxia may closely simulate gall-stone colic.

Abdominal tumors present great diagnostic difficulties and

the most skilled clinician often goes astray. Those involving the stomach are perhaps the least perplexing. Gastric symptoms of short duration, loss of weight, signs of food retention, and subacidity suggest carcinoma. Confirmation may be obtained by an *x*-ray examination. The position of the tumor, if it is in the upper abdomen, is not of great moment. It may be anywhere from the right rectus to the left flank, from the epigastrium to below the umbilicus. Every effort should be made to diagnose malignant disease before a tumor appears, so that removal can be accomplished before other parts near and distant are inseminated.

There is a type of tumor in the abdomen that gives rise to unusual diagnostic troubles. It may be found in the region of the colonic flexures on the left side and on the right side anywhere from Poupart's ligament to the border of the ribs. On first examination such a tumor will impress one as malignant if the patient has reached the cancer age, or as tuberculous if he is younger. Careful examination will, however, show certain peculiar features: the growth is rapid; there may be a spot of great tenderness; there may be a periodic or continuous fever; and the blood count shows a leukocytosis. These signs indicate, I believe, that the tumor is inflammatory, no matter how hard or nodular, how small or large the growth may be. The mimicry of disease is never greater than in the case of these inflammatory swellings which have their origin in the appendix or in a diverticulitis of the colon.

The diagnosis of appendicitis is commonly so easy that the veriest tyro in medicine can make it. Difficulties arise in chronic cases, where the symptoms are chiefly those of dyspepsia and in certain acute cases where the appendix occupies an abnormal position. In every case of dyspepsia in early adult life, the physician before incriminating the stomach or the nervous system, as is so often done, should carefully palpate the region of the appendix. Soreness, when the colon is inflated with air, and pain referred to the epigastrium on pressure at McBurney's point, are said to be diagnostic signs of chronic appendicitis.

Intestinal obstruction is an important field in which prompt

medical diagnosis with the aid of the surgeon often saves life. I shall not take your time to rehearse the symptoms of the various types of obstruction. Some, like strangulated hernia, are easily recognized if one makes it a practice in all cases to examine the hernial openings whether a hernia is visible or not. I want to speak about two points, namely, that acute pancreatitis may simulate ileus and that kaleidoscopic uremia may present the picture of intestinal obstruction.

With regard to the spleen, the condition of chief surgical interest is splenomegalic anemia, splenogenous cirrhosis of the liver, or Banti's disease. Here it is the medical man's duty to establish a correct diagnosis, inasmuch as removal of the spleen is the approved and proper treatment. The diagnosis is based on enlargement of the spleen, on a history of hemorrhages from the nose or stomach, on the presence of anemia with leukopenia, and, in more advanced cases, on evidence of hepatic disease.

The surgical conditions involving the kidneys give rise to pain in the loins and flanks. If the trouble is inflammatory, whether intra- or extra-renal, there will be tenderness in the costo-iliac space. From the surgeon's standpoint the conditions demanding particularly accurate diagnosis are perirenal abscess and unilateral nephritis.[1] A microscopic and bacterioscopic examination of the urine will assist in the diagnosis. It should be borne in mind, as I have already mentioned, that herpes zoster may simulate in its preëruptive state these renal conditions as well as appendicitis and gall-stone disease.

One other condition needs mentioning here on account of the diagnostic problems it brings in its train, and that is Pott's disease. Pott's disease is never too old to cause trouble. For some unknown reason the tubercle bacilli in the sheltered region of the spine seem to live forever. If an abscess forms it will travel downward and may then cause symptoms of great perplexity—intercostal neuralgia and thoracic aneurysm being some of the diagnoses made.

[1] See paper by Riesman and Müller, "Acute Unilateral Nephritis, with Report of a Case," Archives of Internal Medicine, June, 1913.

In the case of the extremities, the surgical conditions coming under the physician's ken are few. I have mentioned dislocation simulating neuritis. Perhaps the most important is osteomyelitis, which when near a joint is likely to be mistaken for articular rheumatism. In a child persistent pain at or near one joint is almost never rheumatic in origin. Furthermore, it should be remembered that what may seem to be abscesses along the course of the bones may in young infants be blood extravasations the result of scurvy. A proper diagnosis by the medical man, based on a careful history of the case, may prevent a useless and hurtful operation.

I have not exhausted the surgical conditions which it may become the medical man's duty to diagnose. I have tried to focus your attention upon those more difficult ones, borderland cases they might be called, in which keen medical diagnosis is necessary for the proper coöperation with the surgeon, a coöperation he should not only be glad to accept, but eager to ask.

I would emphasize once more the value of a medical examination, not only in obscure but also in plain, simple surgical cases. The physician might find diabetes, nephritis, grave anemia, bronchitis or serious heart disease, any one of which would influence the surgeon in his work. Many delayed deaths after operation might thus be averted. I also feel that in medical cases which may at any time assume a surgical aspect, the surgeon should be consulted long before an operation becomes imperative.

In order to increase his diagnostic skill, the physician should make it a rule to be present at all operations on cases that have come before him. Sir Berkely Moynihan, in England, and Deaver, in this country, have found it necessary to remind us physicians of the value of the *autopsia in vivo*.

In closing, permit me to say that in all spheres of life the best work is team-work, and the best team-work for the cure of human ills is the great medical triumvirate—the laboratory man, the surgeon, and the sane, level-headed physician.

THE MEDICAL TREATMENT OF SURGICAL CASES[1]

By JOHN H. JOPSON, M.D.

The attempt to bring within the scope of a paper such as this a consideration of even the outlines of the subject assigned to us, is a task which would seem well-nigh impossible. When one remembers the many forms of medical treatment, including pharmacotherapy, dietotherapy, sero- and bacteriotherapy, hydro- and mechanotherapy, psychotherapy, with half a dozen others in constant use, and most of them applicable at one stage or another to a large proportion of surgical cases, their mere enumeration will suffice to indicate the vastness of the subject. It is self-evident that any one of these methods alone could furnish the subject for a prolonged discussion which would indicate only the outlines of the field and not fill in one little corner with the technical details. If, for example, we should confine our attention to a consideration of medical treatment in its narrowest sense, namely, the use of drugs as an adjuvant to surgical measures, we could scarcely indicate the general principles of therapeusis as applied in surgery, whether before, during, or after operation in the uncomplicated case, to say nothing of the intelligent discussion of the many medical problems which may arise during the progress from sickness to health of the individual who suffers from a surgical ailment.

It is apparent that the subject must be studied from a different standpoint than the enumeration of lists of drugs with their indications. Again, it is not our intention to discuss the error

[1] Read October 1, 1913.

into which medical men sometimes fall by persisting in the medical treatment of cases which properly belong in the domain of surgery or of habitually adopting internal treatment as an alternative to the knife. Such medical treatment of surgical cases, while common enough even at the present time, is, fortunately, becoming less and less frequent, and there are indications that in the judgment of some profound thinkers, and we would include some surgeons in this category, the pendulum has already swung too far in the direction of surgical intervention in certain fields, and that we are being urged or encouraged to undertake operations for certain disorders, the causes of which are found in morbid chemical processes of nervous origin rather than in mechanical or other localized pathological processes.

It is rather to a *résumé* of some of the well-recognized principles which guide us in the internal treatment of surgical cases that we would call your attention. These include a recognition of the necessity for, and of the relative importance of, those measures which can be grouped under the head of medical treatment in various types of surgical cases, and their relation to preëxisting medical conditions. Also the modifications of medical treatment which are called forth by surgical complications arising in connection with such preëxisting disease, and the desirability of special training in the handling of them; the necessity of organizing our hospital work so that the medical treatment of surgical cases may be amply provided for; and, finally, the wish that something may be offered for discussion which will stimulate us in our efforts to improve our methods of treatment, for that such improvement is possible or needed the initiation of this discussion would seem to indicate.

There are certain broad and universal indications for medical treatment in all surgical cases which it may be as well to define at the outset. We may take, for example, such treatment as is indicated in what may be somewhat incongruously termed the "normal" surgical patient. By this we mean the individual who comes for an operation, it may be for a benign tumor, or for a

malignant growth in its early stage, or for an intercurrent operation for some chronic condition which has not as yet seriously affected the general health, an individual whose metabolism is normal and whose functions in general are not seriously embarrassed. In such case the problem is the performance of a major operation for a local condition which is uncomplicated by other morbid states and in which medical treatment, barring complications which develop as the result of the operation, may be reduced to a minimum.

Medical treatment would then include the preliminary preparation in the way of diet and attention to the gastro-intestinal tract, which is usually considered necessary to the administration of a general anesthetic, and the performance of a major operation, modified in some degree by the region which is to be invaded. If, for example, an operation on the upper abdomen, the gall-bladder or the stomach is contemplated, the preparation may differ somewhat from that for an appendectomy, and this again from that required for an extra-abdominal operation.

At the time of operation certain medical measures may be demanded, usually of an emergency nature, to combat by internal means such complications as shock and hemorrhage. Following operation, pharmacotherapy to allay postanesthetic discomfort and vomiting, to secure sleep, to relieve pain, to insure proper action of the bowels, to conserve kidney function, is often indicated, while a continuation of treatment for such complications as occasionally arise as a result of the operation *per se*, if such exist, will of course be demanded.

The general care and oversight of the patient will cease only when he or she is restored to complete health, and the responsibility of the surgeon is usually considered to terminate only when such a stage has been arrived at. Such are the indications, briefly enumerated, in the "normal" surgical case.

We can easily define several other classes of cases almost equally numerous in which the indications for medical treatment are more acute as well as much more numerous. These would

include the large group of surgical emergencies in which a severe or dangerous condition develops before the patient reaches the hands of the surgeon, either as the result of trauma, or of the nature of such surgical disorders as fulminating appendicitis, the internal or external strangulation of the bowel, or one of the many surgical accidents which admit of scanty preliminary preparation and treatment. In such cases intervention must be undertaken not regardless of, but in spite of the general condition, and complicating ailments. Shock, hemorrhage, and sepsis will be more frequently encountered than in the first group we have considered. Medical treatment of an energetic nature, usually in such forms as the surgeon is most familiar with, is constantly demanded and often in the guise of methods of treatment which have been developed by the surgeon himself in response to the frequent demands which he encounters in his daily work.

There remain other classes of cases in which the indications for medical treatment are equally urgent and more complicated. For example, a surgical emergency frequently arises in the course of a serious acute medical illness for which the patient is under treatment, or as a direct sequel of the same, as for example, the perforation of an intestinal ulcer in the course of typhoid fever a gangrenous cholecystitis developing under the same circumstances, or an empyema which follows closely on the heels of a croupous pneumonia. We have added to the original pathological process for which the patient is under treatment a complication which, while it may for the time overshadow in importance the original ailment, and call for the institution of a new train of remedial agents which are adjuvants to surgical intervention, and are necessitated by the new indications arising as a result of the surgical complication, cannot displace entirely those therapeutic measures which were demanded for the illness from which the patient still suffers or from which he has only just been relieved. In such cases medical treatment in all its forms assumes an importance which transcends that present in the groups we have already considered, and by reason of which the therapeutic resources of surgeon and internist alike may be tested to the utmost.

Again, there is an equally important group in which some pre-existing chronic morbid process exists in combination with an acute or chronic surgical condition, and in which said surgical condition may be independent of or directly dependent upon it, but in which the medical and surgical treatment alike are modified by its presence. Among such complicating medical ailments it is necessary only to mention arteriosclerosis, nephritis, diabetes, chronic alcoholism, and senility as a few of the morbid processes constantly seen in alliance with surgical disorders, and all of them of prime importance in modifying the prognosis and treatment of a host of surgical conditions. Again, in such cases medical treatment of a highly specialized nature may be necessary to insure a favorable result.

Finally, there is a limited group in which there is still, it may be, a fair opportunity for division of opinion as to which class, medical or surgical, the case belongs; in which the battle for possession between the internist and the surgeon still continues, or in which medical treatment must be continued until a favorable moment for surgical intervention is reached. A case of exophthalmic goitre at the top of a wave of hyperthyroidism may be fairly considered under this heading, one in which surgical treatment has not yet had a trial, or in which the preliminary ligation of the thyroid arteries is to be followed at a favorable moment by a lobe extirpation, and in which medical measures are of manifest value: this will furnish a fair example of the nature of the cases which we group in this place.

A review of this more or less artificial classification will show that in a generous proportion of our surgical patients medical treatment is reduced to a minimum. In another class while the indications are acute they are mainly those which call for methods of treatment, with most of which, as practised at the present time, the surgeon is thoroughly familiar, and for the evolution of which he is largely responsible. In the remainder a combination of medical and surgical indications exists, which in the more serious cases may put to the test the resources of the most expert therapeutist as well as the most accomplished surgeon. In the aggregate

an amount of medical knowledge and a facility in its application are demanded which should put to shame those who would classify surgery as a mechanical pursuit. These are the demands which our surgical patients make upon us. How and by whom are they to be met? The ideal surgical attitude is not that which contents itself with the extirpation of this or that diseased focus or the correction of this or that abnormal condition, but which considers the organism as a whole and either consciously or unconsciously endeavors to restore its equilibrium. As Musser has said: "The organism which is in perfect equilibrium with its environment and has all its parts in equilibrium is in a state of health." It should be the object of the surgeon to avoid, as Musser emphasized, "the old idea that disease is a special 'something' within the organism, the casting out or the removal of which is brought about by a special method adapted to each cause." Hence, it must be that if the responsibility for restoration to health after an operation be with the surgeon alone, to him will fall the direction of many forms of medical treatment; that is to say, if he is not to remain content with removal or correction of the cause on the one hand or the effect on the other without regard to the condition which, as Musser says, is the disease. The dashing surgeon, in Bernard Shaw's witty but abusive travesty on the medical profession, who corrected all ills by the removal of the "nuciform sac," was probably frequently at fault in his diagnosis. But, granting that his diagnostic ability was unerring, he would still be greatly in error if his treatment stopped at the removal of the offending cause, without making provision for the after-care of the case. This after-care would include those therapeutic aids to restoration of the normal functions of the various secondarily affected organs, and the various physical and psychical disorders which had been produced by their faulty activities.

As a consequence of this responsibility for the final outcome we find that in the great majority of instances the medical treatment of the surgical case is left largely in the hands of the surgeon, except in certain of those borderline cases already mentioned.

In the main, it may be said that the medical measures employed by the surgeon are not radically different in the majority of instances from those of the internist, except insofar as they are modified by the training and view-point of the surgeon as influenced by the conditions which he most frequently sees.

Most of his therapeutics as applied to surgical conditions he has learned after leaving the medical school. As Wilbur has said, in discussing the teaching of therapeutics, "The historical element, which is such a strong factor in hampering our medical schools, still separates medicine and surgery from therapeutics. They must all go together and grow together." In considering the treatment of the "normal" surgical case, so-called, it is to be remembered that complications are few and the after-treatment has been of late much simplified. We no longer consider it necessary that our patient should be tortured with thirst, refused a harmless anodyne, vigorously purged on the second day, or starved until the fourth or fifth day. As little interference as possible with the patient's comfort and with the normal functions is the standard of most operators. When indications for medical treatment arise in such cases they are generally clear cut, and the therapeutic measures employed and the drugs prescribed are comparatively few in number and those which, as a rule, give the promptest result with the minimum of dosage. The surgeon usually aims to administer quick, decisive blows when he has to drug his patients, for postoperative conditions forbid the more slowly acting and stomach-disturbing remedies which the medical man might be tempted to order. As we have already said, the surgical therapeutist must receive special training in prescribing. No more forcible example is needed to illustrate this fact than the experience all surgeons have in our hopital wards when a resident physician goes on duty on the surgical side after serving his time on the medical service, especially if he be a therapeutic enthusiast whose activities have previously had full sway. We constantly find it necessary at such unfortunately too frequent intervals to revise the treatment sheets of our surgical patients and to eliminate a long list of drugs slow of action, inefficient, or overstimulating,

and disturbing to the gastro-intestinal tract, and to substitute those simpler remedies which have proved their worth in surgical practice. To a patient suffering from pain and sleeplessness after operation a hypodermic of morphine is worth many doses by the mouth of bromides, trional, sulfonal, veronal, or other forms of slowly acting hypnotics. Hypodermic stimulation for the flagging circulation carefully watched, and such swiftly acting agents as camphorated oil and adrenalin displace the more slowly acting remedies which are habitually administered in many medical emergencies, while enteroclysis, hypodermoclysis, intravenous infusion, and transfusion, measures which the physician has quickly appropriated for his own, are more or less in constant use.

Nor is the surgeon a stranger to preparatory methods of treatment which a careful study of his cases will often determine to be necessary. Indeed, upon the institution of proper medical treatment in the line of preparation depends much of the success of his operation and the freedom from complications thereafter. Careful physical examination, and investigation by the most modern laboratory methods of each and every organ and system, cardiovascular, respiratory, gastro-intestinal, genito-urinary, and nervous, are indicated in all cases which admit of the time for such preliminary study.

The indications for medical treatment which such a preliminary study furnishes may call for the transference of the case for a time to the internist before operation is undertaken, but in many cases the surgeon will be his own therapeutist in directing the preparatory treatment.

Still another line of preparatory treatment has been added to our armamentarium, and that in the form of the anoci-association methods of Crile. Anoci-association embraces both psychical and physical measures, many of them long employed by men of tact and judgment; others, comparatively new or entirely novel, but all put upon a systematic plane and a logical physiological and therapeutic basis by this enthusiastic and gifted surgeon.

The principles of anoci-association are undoubtedly of great value, especially in those borderline cases where, as Crile has

phrased it, the threshold of the brain is lowered to the entrance or effect of anoci-associations. In the carrying out of the anoci-association methods, medical treatment may be said to be represented in various ways, especially in the line of psychotherapy, and for their proper use not only is a well-trained hospital staff of prime necessity, but the demands upon the surgeon's time in connection with them are not inconsiderable.

The question which we are attempting to solve in this discussion is, "Are we giving our surgical patients the medical treatment which they should receive, or has the time arrived for review, rearrangement, and reform?

Most surgical work is done in hospitals where it should be done, and in these days when hospital reorganization and reform are in the air the interest of the patient should receive the first consideration. It is unfortunate that in so large a majority of surgical cases the connection of the internist with the case ends when the diagnosis has been arrived at and the patient transferred to the surgical ward. The internist may and should follow the patient to the operating-room to see his conclusions confirmed or proved erroneous, that he may be given the chance to glorify, or excuse himself, as the case may be, as well as to learn those lessons of living pathology of which we now hear so frequently. When the patient goes back to the ward his responsibility is usually considered as ended, unless he be called upon to combat some complication of a medical nature with which the surgeon feels unable or unwilling to cope. If the patient be a private one the medical man often follows, through necessity or desire, the postoperative course of the case and is then in a position to offer his services as a skilled therapeutist. But the great majority of our cases are ward patients, and in losing touch with them the medical man does not have those opportunities to familiarize himself with postoperative conditions and their special therapeutic indications which he might otherwise enjoy.

For the diagnosis of surgical conditions we must humbly pay our tribute to the many contributions in this line which we owe to the medical man. It was Fitz who by his studies placed the

pathology, symptomatology, diagnosis, and indications for treatment of appendicitis upon a scientific basis, and it was Wilson who first suggested operation in typhoid perforation. If we examine more closely into the history of the improvements in preoperative and postoperative treatment it will be apparent that we owe them mainly to the surgeon himself. The notable contributions to the treatment of peritonitis, the aftermath of appendicitis, have come from such men as Murphy, Deaver, and Fowler who, constantly associated with this and similar complications, were able to detect the necessity for something more than purely operative treatment, which would aid the peritoneum and the organism in general in limiting or overcoming such widespread inflammatory lesions. We mention this particular example as showing the opportunities afforded the trained mind by continual observation of postoperative and complicating conditions.

We are far from the limits of useful knowledge in the treatment of this and allied surgical disorders as well as of complicating medical conditions, some of which threaten the success of an operation, while others add greatly to the patient's discomfort. Both patient and surgeon suffer from the lack of coördination with the internist after the operation which would certainly smooth the road to convalescence on the part of the patient, while it would lead to the discovery and adoption of newer methods of postoperative treatment which the trained therapeutist would be stimulated and afforded the opportunity to develop. Both sides are the losers in this lack of coöperation following operation. It is painful, for example, to have the daily experience of seeing in consultation with men who are really expert diagnosticians, cases of appendicitis in which the physician tells us as a matter of course that the bowels have been thoroughly opened by the administration of laxatives and even more drastic purges. A few short excursions into the surgical ward would show him that he has committed a grave blunder and one which militates against the success of an operation. In this respect the surgical interne of brief experience dwells on a safer therapeutic plane than a graduate of fifteen years' standing, who has not learned the lesson that physiological rest

offers the best opportunity for localization of a virulent inflammatory process and that the bowels are not inflamed in these cases because they are inactive, but that they are inactive because they are inflamed.

At the present time the problem of medical treatment in the surgical wards has still another side to it. This is due to the fact that the purely operative side of surgery occupies so much more of the surgeon's time than was the case but a few years ago and reduced by just so much the time which he spends in the wards and devotes to the medical side of his cases. When we consider that our busiest men spend from three to six hours daily for several days a week in the operating-room, and this in addition to the time devoted to office practice, to consultations, to teaching, to study, and to the preparation and the discussion of papers on surgical topics, it seems like attempting the impossible for them to continue with the entire responsibility of all cases under their care no matter what the complications may be. This tax upon their time has resulted in the past in the adoption by many surgeons of a so-called postoperative schedule as some protection against the vagaries of a partially trained assistant. The value of such inelastic schedules is open to serious doubt. They give too little consideration to the individual and the aberrant case. Nothing can replace the daily careful bed to bed inspection by the surgeon or by a properly qualified assistant, and in the organization of surgical services today the necessity for such assistance is generally recognized.

To attempt to more than hint at the necessity of thorough organization of our surgical services and the provision for something more than the oversight afforded by resident physicians is out of place at this time.

The day when one surgeon with an organization which comprised nothing more than the assistance afforded by house physicians would care for a large and active service is now out of date, and it is becoming generally recognized that we must have provision for one or more assistants on the wards whose duties are sharply defined, whose authority is recognized on all sides

and whose oversight of both medical and surgical treatment insures a maximum of efficiency on the part of both visiting and house staffs.

We would not wish to be understood as saying that in the past all of our busy operators have not given their patients, with the assistance of their house staff, the medical care they should have. There are "Admiral Crichtons" in our profession, too, and the devotion with which their patients repay them in after years proves that the most interested party can vouch for the completeness of the attention which he has received. But we are dealing in this discussion, not with individuals, but with general principles, and it would be a blind conservatism which failed to see some opportunities for improvement.

There will always be some surgeons who excel in diagnosis, some in operative skill, and still others in medical treatment and the after-care of their patients. Even the laity are quick to realize this, as we have frequent opportunities to learn. Homer Gage, in a recent article on "Some Abuses in Surgical Practice," brings out the point that in his opinion "the purely mechanical side of surgery has been receiving far too large a share of our attention." This view has been forced upon him by a knowledge of the indiscriminate and reckless operations performed today by extremely radical or by partially trained men. His remarks cannot be interpreted as meaning that the surgeon can be too familiar with the most improved methods of technique or too dexterous in their execution, if such knowledge and dexterity decrease the risk of operation or insure the most favorable result. They can only mean that such knowledge and training should not be obtained at the cost of a knowledge of pathology, of diagnosis, or of time devoted to careful and thorough preliminary examination of the patient, or to medical oversight before and after operation. Nor can manual dexterity take the place of that good surgical judgment upon which Finney has written so forcibly and eloquently, and a congenital absence of which, or the failure to acquire by hard work and long training, separates the safe from the unsafe man.

Lawson Tait, at a meeting of the British Medical Association in Birmingham advised those present not to waste their time on the scientific exhibits, but to visit some of the great industrial establishments and learn to imitate the manual skill of the Birmingham button makers. Such a remark probably did not add to his popularity with the Committee on Exhibits, and revealed a point of view not entirely in harmony with our own at the present day.

We have tried to demonstrate in this review of the subject:

1. That in practically all surgical cases there are certain fixed indications for medical treatment, less in some and greater in others, and that while such indications can be reduced in number, they cannot be done away with entirely. In some instances they are acute, and in others complicated and demanding great therapeutic knowledge and skill to successfully cope with them. Moreover, that their proper treatment is modified to some extent by the surgical conditions present, and by operative as well as non-operative surgical methods of treatment.

2. That there exists a need for special training along these lines, and that there is room for improvement in our medical treatment as seen in the rank and file of our cases and in the hands of all of us.

3. That in a thorough organization of our hospital staffs which provides for coöperation of physician and surgeon in the line of treatment at all times there are opportunities for improvement which only such association affords. Something more than a haphazard coöperation at critical times is needed to insure success in all cases and in our plans for hospital reorganization and reform some provision must be made in this direction. If the physician on duty, with his assistants, could pay weekly or semiweekly visits to the surgical wards in company with the surgical staff and go over the medical treatment of cases with the surgeon, there would be afforded the opportunity for the medical man to familiarize himself with the needs of surgical patients, and for the physician and surgeon together to develop methods of pre- and postoperative treatment that not only would add greatly to the comfort of the patient, but would in time greatly increase our

therapeutic knowledge and open new fields of medical research. A striking illustration of the value of coöperation is seen in the new field of bacterin therapy, where the association of bacteriologist and surgeon in this highly specialized from of treatment is usually considered necessary. Time does not permit an amplification of this subject, but it need only be pointed out that few surgeons, unless with special and very recent laboratory training, care to "go it alone" in this particular field, and now that the days of therapeutic nihilism seem rapidly vanishing, and the search for specific forms of treatment of synthetic and biological character is being so ardently pursued, we believe that every opportunity should be afforded for their development by those best qualified for the investigation.

DISCUSSION

Dr. J. Chalmers DaCosta: I fear that I somewhat misapprehended the nature of this symposium. My thought was that the medical man was to set forth certain surgical complications which are prone to arise in the course of medical maladies, and that the surgeon was to develop certain medical complications prone to arise in surgical maladies. I supposed that both were to consider how far they ought to go in treating these complications before calling in an expert. My friend who spoke from the medical side has apparently almost reached the conclusion that the case is to go to the surgeon when it is pretty well along the road to extinction, and that the surgeon is to stand at the block, axe in hand, and receive the case when the medical man shall deliver it to him. We all recognize that many medical cases have a surgical side, and we all recognize that every surgical case has a medical side. A physician does not have to be a surgeon, but every surgeon is and must be primarily a physician. Nearly every surgeon in his early years has been a general practitioner and during the rest of his life he remains a physician in many ways. When a man devotes himself to surgery he must of necessity abandon general practice, and when that comes to pass he loses somewhat his skill in the refinements of medical practice. Few practising surgeons retain high skill in auscultation. When I was a resident physician in the medical ward of the Philadelphia Hospital I possessed more skill in auscultation than I do today.

I feel that in managing an ordinary surgical case beset by ordinary medical troubles we do not need the aid of the specially trained physician. In other words, I believe the ground that Dr. Jopson took is true, and that in an uncomplicated case the surgeon can in all respects manage the situation himself. In a doubtful or a difficult case, he should call in a physician, but that does not mean, as I understand it, that the physician rules the situation. There is no way by which the surgeon can abandon his own individual responsibility. The surgeon who has the case is the man in charge, unless every surgical feature of the case has passed away, when the surgeon should at once transfer the case absolutely to the physician. As long as the case that was brought to the surgeon for a surgical condition retains surgical elements, so long must the surgeon be responsible. There is no way by which he can yield, evade, hide from, shuffle off, or abandon his personal responsibility. The surgeon's responsibility involves the making of the diagnosis, the decision as to an operation, the selection of an anesthetic, the operation, and the postoperative care. In reaching conclusions in ordinary cases, he may properly rely upon himself. In cases requiring special examination because of some medical complication beyond his skill, he should call in a medical colleague to give an authoritative opinion. He should consider that opinion and give the greatest weight to it, but should make the final decision himself. No conscientious man would accept the dictation of even the most eminent medical man in this room that a case sent to him was to be operated on, unless he examined that patient and agreed with the conclusions of the sender. To do anything else would relegate the surgeon to the old degraded rank of a barber surgeon. I value in the very highest degree the aid of my medical colleagues. I gladly admit that there are multitudes of situations connected with the diagnosis of a disease which has become surgical in which I may need, and badly need, the help of my medical colleagues. The surgeon has many cases brought to him which he had to refuse to treat surgically. Sometimes he has to refuse to treat cases surgically that have been sent to him by the physician to be so treated. When he finds that a case requires specially trained medical treatment he ought to refer it at once to the medical man. For instance, there is in the Jefferson Hospital now a case of violently acute exophthalmic goitre which I placed in the hands of Dr. Hare. Also a case of hyperthyroidism and dyspituitarism which I placed in the hands of Dr. McCrae.

The physician is often of the greatest possible help when the surgeon is trying to decide the form of anesthetic suited to a complicated case. The question as to whether an anesthetic is to be given at all must arise, if the person has an inactive or limited lesion of pulmonary tuberculosis.

The physician's advice should always be sought when there is some form of heart disease. In many of these conditions I would not trust to my own ear. The after-treatment of a case with mere ordinary conditions the surgeon is competent to manage. Frequently, however, there arise conditions which call for the trained ear, the practised judgment, and the therapeutic resources of our medical colleagues. This is true of pulmonary difficulties which may follow operation. The average man feels the effects (nervous and physical) of a severe surgical operation for a long period of time, just as some people feel the result of a railroad accident. During that period of partial ill health the patient requires skilled medical care and is usually better off with a physician than with a surgeon. In other words, cases which were medical before coming to the surgeon are again medical after they leave the surgeon.

Dr. M. Howard Fussell: I think that as Dr. Riesman has said, "team work" is what we must aim at, and that it is, after all, the solution of the question being discussed tonight. We must positively have a clear conception of the medical condition, likewise a clear conception of the surgical condition and of the pathological state and of the laboratory findings if our cases are to get well. Of course, the average case is not being discussed, but the borderline case, as Dr. DaCosta has said. I agree with Dr. Riesman that the majority of cases of indigestion are not surgical. There are undoubtedly conditions due to hyperchlorhydria and other functional conditions not dependent upon gall-stones or gastric ulcer or appendicitis. But my own feeling is that after a case has been carefully studied by the laboratory tests and rationally treated and does not yield to treatment, the surgeon should be called in to help in the diagnosis, operate, if necessary, and to treat the case during convalescence. Dr. DaCosta has just said that the medical case becomes surgical and then medical again. It seems to me that it is a medical case all the way through. These are the cases of indigestion for instance. All of us have been guilty—I know I personally have been guilty—of treating these cases with indigestion as indigestion, instead of looking for gall-stones, for chronic appendicitis, for ulcer. These are the three things that always confound us, and I am sure there are many cases of chronic appendicitis, many of gall-stones and ulcer, which cannot by any possibility be diagnosed without an exploratory operation.

Dr. Riesman mentioned many things that might be mistaken for appendicitis. Pericarditis certainly can be frequently mistaken for it. Not long since there came under my notice a lad of five years with long-standing and severe pain in the right iliac fossa. The attending physician, who was extremely able, thought he had appendicitis. As there was some doubt in the matter he called in a surgeon and also a physician.

There was still doubt in our minds, and we agreed that the proper thing to do was to put the child under careful observation for a few hours and then decide. Within twelve hours the patient had marked pericardial friction. He went through an attack of pericarditis and did not have appendicitis. It is that kind of a case of which we are talking when we say that we need the surgeon, the physician, and laboratory methods. In proportion as the medical man realizes the surgical needs in his medical case, and the surgeon, the medical needs in a given case, that much safer is the patient.

Dr. Da Costa says that the surgeon is the officer in charge. While he may be the officer in charge for part of the time, when a family physician, who knows what he is about, calls a surgeon for consultation his duties do not end. He is a co-worker, or should be, with the surgeon. Certainly the family thinks he is and has the right to so regard him. Just as Dr. Da Costa said, many cases after a severe surgical operation need the offices of a physician for a time. But no family physician has a right to give up a surgical case after the surgeon is officially called.

One of the great troubles with the medical man is the tendency to be slow in calling in help in surgical matters. Just as Dr. Jopson said, this is probably becoming less common than formerly, but it is all too common even yet. There is some difficulty to get a surgeon to operate in cases manifestly surgical to the medical man's mind. Take a case of obstructive jaundice, in which the diagnosis is not possible from a medical standpoint. There, at least, an exploratory operation is demanded. If a patient is extremely ill, some surgeons will not give him the benefit of a doubt in an operation. Personally I feel that in severe conditions demanding surgical interference the fact that the patient may die from such operation is no reason to refuse him operation. It gives him the one chance for life.

Dr. Joseph Sailer: Among the complications following surgical operations I have been impressed with the relatively frequent occurrence of acidosis. Omitting the difficulty of a concise and accurate definition of this term there can be little doubt that in certain morbid conditions there is a faulty splitting of the fats and proteids usually, but not invariably, associated with a defective utilizatfon of the carbohydrates, which results in the formation of certain acids, particularly betaoxybutyric acid and aceto-acetic acid and acetone. These then enter the blood current and are excreted to a certain extent by the kidneys and during respiration, while in the blood they may or may not give rise to fairly definite symptoms. It is neither necessary or desirable here to enter upon the discussion of all the various forms of acidosis, but there appears to be a considerable difference clinically between those types that come on slowly and

in which long periods of time the usual tests for diacetic acid and acetone in the urine are positive and those cases in which there is a sudden solution of those substances in the blood serum. In the former the symptoms may be very trivial. In the latter they frequently are of extreme severity and the patient may die. Practically all the chronic forms of acidosis occur in association either with diabetes or starvation, and it is possible that the nature of the process by which the acidosis occurs is the same in both cases. I have records of three cases in which diacetic acid and acetone were continuously present for a period of over two years before death. In one of these the urine contained glucose in large amounts and occasionally pentose was also present. As both diacetic acid and acetone were found in the first specimen, it is probable that the condition had preceded this examination for a considerable period of time. In a second case diacetic acid and acetone were also found at the first examination and continued present in considerable quantities until death. The patient, a child, aged fifteen years, maintained her weight and was able to take considerable amount of exercise, although the quantity of sugar in the urine was never below 5 per cent. on a strict diet.

The picture is very different in the acute forms, particularly in paroxysmal acidosis of children. Symptomatically this corresponds very closely to the acidosis that comes on after anesthesia. A child apparently well will suddenly complain of nausea, vomit undigested food that has been taken several hours before with a good appetite, and then continue to vomit for a period of from six to twenty-four hours, vomiting being associated with violent retching and great prostration. The odor of acetone is detected early upon the breath, and it is always found together with aceto-acetic acid in considerable quantities in the urine, even in specimens obtained at the very beginning of the attack. I have not yet in any case had the opportunity of examining a specimen before an attack came on.

In the postanesthetic forms of acidosis the picture is somewhat different. I do not refer here to the mere laboratory report that the tests for acetone and aceto-acetic acid are positive, but to a distinct morbid condition that is most alarming and may, I believe, result fatally. Let me mention briefly two that came under my observation. I was called by Dr. George B. Wood to see a little girl, aged nine years, upon whom he had operated about thirty-six hours before. The operation consisted of removal of the tonsils and adenoids. It was accomplished without incident and the patient apparently bore it without difficulty. About twelve hours later she began to vomit and continued vomiting at intervals of from five to fifteen minutes until I saw her. She was then very much prostrated and her parents were anticipating the worst. Vomiting was associated with violent retching, after which a small amount of bile-

stained fluid was expelled, which contained some mucus. The heart's action was rapid. The skin was cold. The abdomen was retracted. The temperature was subnormal and the patient profoundly exhausted. The odor of acetone upon the breath was quite distinct. Shortly after the institution of enteroclysis with 6 per cent. bicarbonate of soda solution the vomiting ceased and the patient made a rapid and complete convalescence.

The second patient was one seen with Dr. J. Chalmers Da Costa. He had done a splenectomy, in the course of which there was considerable loss of blood. The patient, however, had rallied well from the operation. Twenty-four hours later he began to vomit, the intervals ranging from five to twenty minutes. The vomitus was green, sour smelling, and the quantity very small. The effort to vomit seemed to be profoundly exhausing. There was a great deal of pain, discomfort, and some slight delirium. The stomach was washed, with very little relief, the odor of acetone being quite distinct when the patient was seen a few hours after the onset of the attack. Without waiting for a urinalysis, bicarbonate of soda was advised. The condition was soon improved but not completely controlled for about twelve hours. A remarkable feature was the persistence of aceto-acetic acid and acetone in the urine for fully a week after the violent symptoms had subsided. During this period the patient had nausea, headache, complete anorexia, and was profoundly depressed.

This may be called the severe form of acidosis following anesthesia. Its cause is not clear. It is said to be more common after chloroform anesthesia than after ether anesthesia. My personal experience with chloroform is too slight to enable me to criticise this statement. It is assumed that it is due to some injury of the liver, but this is at present a pure assumption, and it might equally well be assumed that it is due to some lesion of the pancreas, or, indeed, of any other organ. It appears to develop some time between twelve and twenty-four hours after the anesthesia. The symptoms are vomiting with severe straining and retching. The patient is profoundly exhausted and the temperature is usually subnormal, unless there is some inflammatory fever, and there may be delirium. The most important symptom is the odor of acetone on the breath. This is not difficult to recognize providing one compares it with a small amount of acetone in a bottle. Without this control it may be confused with the odor of stomach contents. Folin has expressed doubt as to whether acetone is ever actually excreted with the breath, but I am quite sure that it is very easily recognizable when it is actually present.

The diagnosis is established upon the discovery of considerable amount

of acetone and aceto-acetic acid in the urine. Whether the tests at present in common use are sufficiently accurate to establish the presence of these substances and exclude all others is not a matter of such grave importance, inasmuch as the fact that they are positive is only a contributory sign to the diagnosis, and, as I have stated before, the tests may be positive without clinical symptoms. The treatment is apparently simple. It consists of the administration of alkalies in sufficient quantity to neutralize the offending substances. The best alkali is probably bicarbonate of soda. Martin Fisher prefers the carbonate, but as it is necessary to use a particular form with a definite amount of water of crystallization it cannot be used very satisfactorily excepting in hospitals where a supply is kept constantly on hand.

The methods of administration are three—by the mouth, by the colon, and intravenously. If retained it would be perfectly satisfactory to administer it by the mouth, but on the whole it is much easier on the patient to administer it by enteroclysis. From a three to six per cent. solution should be employed and should run in so slowly that not more than a pint is given in an hour. At this rate the administration may be practically continuous. The enteroclysis should, of course, be preceded by a cleansing enema. The intravenous method was the one first employed. I have not been impressed with its superiority over the colonic route. In cases of diabetic coma in which I have used it the difficulty of finding the vein has sometimes been very great. For this reason I have employed it only rarely for the last two years. The only conclusion that seems permissible to draw from this note is that the routine practice of lavage of the stomach in all cases of postoperative vomiting is probably not always the best treatment and that it is desirable to test the urine for acetone and aceto-acetic acid for at least three days following each operation.

Dr. John H. Gibbon: From what we have heard, this subject has proved to be an admirable one for discussion, but I am afraid a very poor one for agreement. Personally, I feel as if I had made a trip around the world in eighty days,—the medical world. The borderline is much wider than I had supposed. I have always been glad that I did not practice surgery at a time when the surgeon was told by the medical man just what he should do. The surgeon may be a carpenter, but he also should be an architect. Coöperation between a medical man and a surgeon is absolutely necessary, however, for the welfare of the patient. I feel that although we may not agree in discussion on a matter of this kind, we all feel and act in about the same way when it comes to practice. There is one rule which I think every surgeon should follow, and that is, never to operate unless convinced that operation is necessary. The

conscienceless surgeon is as dangerous to the community as the surgeonless internist.

Dr. Harte: I have been much interested in the two papers presented by the essayists this evening and I must say that I am disposed to agree and disagree with both writers.

Team work (if I must use the expression) is very important, and it is a great mistake that more of it is not done in our hospital work in Philadelphia. A great deal can be learned by a surgeon in going through the medical ward, and I have no doubt the same can be said of the physician.

I recall particularly the work Dr. Lewis and I did at the Pennsylvania Hospital in regard to typhoid fever perforations. It is of untold value to the surgeon to have seen a bad case of typhoid fever from time to time in company with the physician, where the prospects of perforation are great. When this does occur, he is thereby enabled to differentiate many of the symptoms much more accurately than if he were called to see the case without knowledge of its previous condition.

Dr. Lewis has many times sent for me to see cases that had not perforated but which he thought might do so in a few days. We watched these cases together, carefully weighing all the conditions, and when a perforation did occur, I think we were able to recognize it almost immediately, or at least in a very short time after it occurred. The same may be said in regard to cases of hemorrhage in typhoid fever and many of the pulmonary conditions which are ultimately turned over to the surgeon for operation.

Of course, there are times when acute cases come into the medical wards and surgical interference must be resorted to immediately. Here there is little opportunity for the physician and surgeon to study the case together, but where it is possible for two to work over the same case, I think a more accurate diagnosis is obtained than if left entirely to the judgment of one person.

I cannot help but feel, with Dr. Riesman, that if we saw more cases together our results might be more satisfactory. On the other hand, the question of time has often to be considered, particularly by the busy man who does a large amount of charitable work.

The medical cases occurring on the surgical side of the house are usually of a character that can be handled as well by a surgeon as by a physician, particularly as in order to become a surgeon one must have been first a physician, and a good one at that. Today medication does not play such an important part in the treatment of cases as it formerly did, as rest, good food, and a few simple remedies are about all that are required for the ordinary cases as they occur in the surgical ward.

Dr. Riesman: Very few surgical cases originate in the hospital. The majority are brought in from the outside with a provisional diagnosis usually made by the family physician. This being so, it is eminently necessary that the physician, who usually is the first one to be called, should know how to diagnose those conditions in the treatment of which he wants surgical aid. Though he may differ in theory I believe that in practice Dr. Da Costa agrees with the position I have taken. He speaks of many cases being simple and requiring no medical examination. I cannot imagine any case being so simple that a urinary examination or a temperature study is unnecessary. An apparently very simple case may show sugar in the urine—the technique of the operation is just as simple, but the case assumes a totally different aspect and will require medical treatment both before and after the operation. There is hardly an operation more frequently performed than that of tonsillectomy. It is looked upon as trivial and in dispensary practice at least, a medical examination is dispensed with by the majority of operators. Yet there are many tragic instances of death from hemorrhage or cardiac paralysis. How keen then is the regret that a medical examination was not made or that a medical man was not in association with the case. As for a surgeon's treating a mild case of ether pneumonia, I am sure that he is entirely competent to do so, but if the patient were one of his own family would he not ask the surgeon, or would he not expect the surgeon, to call in a medical man to assist in the treatment? I believe Dr. Harte, because of his long experience in consultation in the medical wards of the Pennsylvania Hospital represents very well the position of coöperation that I have tried to define.

Dr. Jopson, closing: The point which I was especially interested in making in my discussion of the subject was that by a coöperation or a continuous collaboration of physician and surgeon through all the stages of the case, before and after operation, there would be afforded an opportunity not only to relieve the discomfort of the patient, but to develop new methods of postoperative treatment. None are so well qualified to develop these as the man who devotes the greatest part of his time to therapeutic pursuits. For most discomforts of the patient coming out of anesthesia there are remedies to be found. Many have been found. There are many to be discovered. If the physician would see the patient with the surgeon after operation, not only would the responsibility be shared but opportunity be given for the development of new methods of treatment which are needed.

TREATMENT OF HEART DISEASE[1]

By ROBERT N. WILLSON, M.D.

A paper on the treatment of heart disease to be practical and useful must needs be brief. Out of many methods and a very extensive literature, there can be selected few measures that accomplish more than the moral satisfaction of physician, nurse, and family, and the discomfort and oftentimes the detriment of the patient. Those few measures are, however, next to invaluable, both in a preventive and a curative sense. For this reason it is of advantage to record the private and hospital successes and failures of every student of heart disease.

Had this paper been written fifteen years ago, it would no doubt have been subdivided primarily into the treatment of valvular disease; next into the handling of myocardial affections; and finally into a discussion of the cardiorenal syndrome. Whereas today the diseased valves have been relegated to the category of damaged fittings or parts of the machinery; the kidneys are more and more regarded as part of the circulatory apparatus; while the condition of the heart muscle, with respect to its blood and nervous supply, with regard to its ability or inability to accomplish its own particular tasks, and with reference to its power to recuperate when overtaxed, is the question of importance in the otherwise healthy body, as well as in the physical economy that must depend upon organs that are tired and lame.

I wish to deal specifically neither with valvular disease nor with dilatation, nor with failure of any one of the inherent functions

[1] Read November 5, 1913.

of the heart. Even the contracting power, the origination of the cardiac impulse, and conductivity, may for the moment be ignored, and the heart muscle (including the muscle band surrounding the valve rings) considered simply as an organ that can and will carry its load day in and day out as long as it is not overtaxed; also one that can become tired and lose a portion or all of its power to respond through fatigue of one kind or another, providing the burden be sufficiently weighty or its application of long enough duration. As the result of the personal observation of an unusually rich field of cardiac disease in the Philadelphia General Hospital and out of it, I have been led, as a heart student, to regard every cardiac insufficiency as an instance of more or less complete muscle and nerve tire. Rest is only a figurative and a comparative term when applied to the heart. Complete rest never enters into its experience. From infancy to old age, it is a matter of constant, unremitting effort, broken only when the physical body is cast aside for one that requires no repair. Even during sleep the vast majority of individuals drive their hearts too fast and too hard by means of the toxins resulting from the overworry, and overeating and drinking, and the general unhygiene of the day. Even though we may not ourselves indulge in the drug habits, few if any escape the toxic influence of our neighbor's or our ancestor's alcohol and tobacco. There is no longer even pure air for those to breathe who desire the privilege. It is worthy of consideration just how many unnecessary heart beats and just how positive a lowering of the cardiac nervous tone are to be attributed in healthy and sick alike to influences of this kind which are fully within our control. Certain it is that arterial and cardiac disease is rapidly on the increase. Equally certain is the fact that effective preventive measures might be instituted that would considerably reduce its incidence.

Preventive Measures. Among the possible preventive measures I would suggest a far more rigid examination of both school and college athletes than is now in vogue, even in the large Universities. Probably there is no youth who engages in the more strenuous forms of athletics without sustaining a marked hyper-

trophy of the heart, and a certain degree of dilatation which does not always disappear or remain a silent factor. I have known more than one instance of a school boy, urged to compete in running races and in football, though carrying a well-defined valvular lesion. Two such come immediately to mind, both having been examined by the physician-athletic director, and both encouraged to engage the one in football, the other in cross country running. One of these boys had repeated cyanotic and dyspneic attacks, his pulse irregular, and his "head swimming" with vertigo, following football practice. The other came to me with his face and hands edematous the morning after a race. Both athletic directors protested when the services of these boys were lost to their schools. Quite an army of future fathers take part the country over in violent competitive athletics during college days. I doubt whether any one of that army goes out into after-life with a perfectly normal heart.

For the female sex I would advise a thorough overhauling of the early feminine regime. I would train the girl outdoors, side by side with her brother, exercising under the same supervision, and allowed the same physical privileges up to the time of puberty. There is no sane reason for making out of him a sturdy sapling and out of her a hot house rose, subject to and inviting every infection and ailment that passes by. Even after puberty and motherhood the girl should not let her body merely go to seed.

Hygiene of the mouth, especially of the teeth, tonsils, and other adenoid tissues, would undoubtedly prevent many an instance of general cardiac involvement usually secondary to valvular disease. There are few heart students that have not witnessed a seemingly organic cardiac murmur and a degree of arrhythmia disappear upon the enucleation of a pair of hypertrophied and useless tonsils. In one recent instance a child (a girl of fourteen years) was sent to me for examination. Her father and mother both had greatly enlarged tonsils, and in both loud apical murmurs could be heard. In their child the tonsils almost met in the median line. The patient was pale and short of breath, even on slight exertion. Her heart presented a loud, rough apical murmur,

and some arrhythmia. Three months after her tonsils were enucleated by Dr. Walter J. Freeman, this child was well on her way to robustness and health and all heart symptoms had disappeared. I have seen similar results from the removal of adenoid masses and a thorough setting of the teeth in order. All of these measures should be instituted before, not after, cardiac damage has been done. Overwork and overworry, especially in combination with overeating underexercising and undersleeping, plus the influence of alcohol and tobacco, form a chain of forces that spell intravascular, intracerebral, and intraspinal hypertension, and result first in chronic arteriospasm, later in arteriosclerosis of all the organs, and eventually in myocardial degeneration and disease.

Rheumatism and syphilis, side by side, form the most frequent etiological factors in valvular disease. I think that there are many indications that the former will some day be shown to be preventable and controllable through a proper hygiene of the gastro-intestinal tract. No argument is required to demonstrate the preventability of syphilis through the establishment and the practise of a single standard of moral and physical health for the two sexes. This will yet become a *sine qua non* of the loyal citizen.

Once remove by prevention all of these very definite conditions leading more or less directly, but inevitably, to cardiac disease, and we would begin to notice a diminution in the number of instances of organic heart involvement that would be as grateful as it is little to be expected.

Prevention furnishes also the main factor in the treatment of the cases of cardiac disease that come under the doctor's care in their very early stages. I have now under observation a woman of eighty-four years, who has lived a long, useful, and none too easy life, including the bearing of children, in spite of a mitral valvular lesion recognized at odd times, and by different physicians that came into her experience.

The manner of living must be regulated to save the heart all work over and above its capacity, and all rude shocks of the nature

of intercurrent disease. Under such a regime a valvular lesion may never constitute real cardiac disease and may prove to the patient even a blessing in disguise.

Next to prevention cardiac rest is the desideratum in all cases of active heart disease.

Rest. I have already ventured the statement that as far as the heart is concerned rest is only a figurative and comparative term. None the less, only insofar as a certain degree of rest is obtainable, is the attempt at treatment worth while. Too often a crippled heart is driven almost to desperation with stimulant medicines and overattention on the part of both the doctor and nurse, when that for which it begs is to be left alone. Very seldom are patients with cardiac disease put quietly and simply to bed, their intestinal tracts swept clean, and the tired heart allowed to save itself as only nature knows how. Otherwise more cardiac sufferers would symptomatically recover. Even as matters stand an astonishing number of patients actually do react under discouraging conditions, and regain temporarily a measure of health, which is usually due to the inherent vitality of the individual rather than to the very questionable treatment. Cardiac rest is therefore the *summum bonum,* the end to be aimed at and attained in all cardiac therapy. How may it be obtained and applied? First of all by *position.* The heart performs its task most easily with the body in that postition which permits of the freest possible respiratory excursion with the minimal effort. This may or may not be the recumbent posture in the given case. It does, however, usually imply the bed. An improvement in the rate and character of the heart action may not be apparent even within a few hours of the time the patient is put to bed. It may require weeks, it may demand months to complete the task, but if the heart tone and vigor can still be restored, day by day will be noticed a little alteration of the rate toward the normal, and a corresponding improvement in the volume and force of the impulse. Thorough cardiac rest requires the *elimination* from the body *of the toxic substances* that drive the crippled heart beyond its powers of endurance. I have already mentioned the toxins manufactured

in the gastro-intestinal tract. They are all cardiac excitants and cardiac poisons. Only a daily intestinal house-cleaning will remove this source of danger and difficulty. The food supply should not exceed the patient's power to digest. The residue should not be allowed to decompose.

If drugs, such as alcohol and tobacco are contributing factors, there must be no hesitation or delay in their complete removal. We have left far behind the age in which either of these substances was regarded as other than a cardiac muscle poison. Other drugs, such as tea and coffee, should be used only for definite purposes, and with the knowledge that they are cardiac whips, and that the heart is already too tired to perform its daily or even its nightly routine.

An active malaria or syphilis will require specific medication before an intercurrent or resulting cardiac involvement will be controlled.

Probably next in importance in the securing of cardiac rest will be the *removal of all unneccessary peripheral, circulatory resistance;* namely, the overload of the heart. This does not mean the lowering of the intravascular pressure, which might prove disastrous. The task must be accomplished without depressing the cardiac vigor (as by aconite), or spurring the cardiac mechanism as to redoubled efforts (as by thyroid extract). If it implies the dilatation of the vessels without cardio-depression or stimulation, I doubt if it can be accomplished by means of drugs. The warmth of the bed, freedom from even too many of the familiar faces of the family, the removal of all care and worry, starvation at first, later a low nourishing diet, occasionally warm (not hot) oxygenated baths (even in the presence of sclerosis); these are the measures that may be counted upon to remove such peripheral circulatory resistance as may be safely and deliberately set aside. I have already referred to the positive relief and rest afforded to every vital tissue, and especially to the nervous and muscular mechanism of the heart by a thorough daily end-to-end cleaning of the bowel. This, it should be remembered, in the patient who is gasping for breath and fighting for existence, does not indicate a need for a

violent purgative. I think I have seen an overactive purgative kill a critically ill cardiac patient. It does mean, however, the earliest possible emptying of the rectum by means of a suppository or enema, or both, and as soon as possible thereafter the cleansing of the entire tube by some bland laxative; preferably by castor oil, given in palatable form, and in as small doses as are likely to prove effective. I know of no other laxative that gives a comparable effect in cardiac disease, and none that produces so little disturbance and harm.

The obtaining of cardiac rest may also require the furnishing of the heart with *ample room for the performance of its duties.* There is now in the wards of the Philadelphia General Hospital a woman with a widely dilated heart, in whom three serious attacks of dyspnea and cardiac arrhythmia have been cut short by the aspiration of large quantities of fluid from the left pleural cavity. Occasionally the evacuation of a pericardial or even an abdominal effusion will be followed by grateful results. Oftentimes the distention of the stomach or intestines by gas crowds the already embarrassed heart for room. In such cases the end to be striven for is obvious.

I know of but one *drug* that will accomplish anything that approaches the much-to-be-desired combination of *new vigor and rest.* That drug is opium, best administered in the form of small and frequently repeated hyperdermic doses of morphine. Both with a view to obtaining the all-essential sleep, and of quieting the nervous overaction of the heart, morphine, when properly used, will furnish results that will prove gratifying to those who have up to now failed to afford it a trial. Heroin and codein may also be given hyperdermically, and will usually produce similar results. Occasionally these two derivatives lead on without warning into a sudden collapse, that can best be attributed to central poisoning. I have never experienced such an untoward result from the intelligent use of morphine in the distressing phases of cardiac disease. After morphine I place in order of value the *application of heat or cold,* directly over the precordia, preferably the ice-bag or the ice-coil, or, when the patient complains of the cold, the hot-water

bag or coil. I have witnessed many instances in which the application of the ice-bag, occasionally superimposed over a blister, has afforded not only subjective relief to the patient, but a gradual decided lowering of the pulse rate and a strengthening and steadying of the general cardiac mechanism, as evidenced by the disappearance of the thready, arrhythmic apical pulse, and its replacement by a much fuller, more regular impact. The improvement in the general condition of the patient has lent additional emphasis to the value of this simple measure. It seems to accomplish its result by affording rest and confidence to a tottering regime, even the momentary salvation of which may be converted into a continued and permanent stability.

The *climate and fresh air* should not be ignored. As soon as exertion seems safe and favorable a cardiac patient should be moved from a moist, cold atmosphere to one that is dry and warm, and of only a very moderate elevation. Just as many a delirious, laboring, febrile case of pneumonia takes on an altogether different and distinctly more favorable aspect when placed in the open air, so the cardiac muscle finds one of its natural tonics and sedatives in oxygen, in the combination and proportion in which it is found in dry, warm, outdoor air.

Sleep is indispensable. Without it no cardiac sufferer ever won a hair line decision in his fight. When we fail to assist nature to secure her own chosen method of rest, we appear poor physicians at best, and obtain correspondingly poor results. It may be laid down as an axiom, that the cardiac patient in whom sleep cannot be induced in fresh air short of heavy narcotization, is fighting a losing battle and is doomed from the start. Not one of the coal-tar products is available in cardiac disease; chloral is also under the ban; the bromides are seldom effective and too liable to disorder an empty digestive tract. We fall back at once upon morphine, already mentioned as the ideal drug in the premises.

When morphine furnishes sleep and rest, we have made our first and most difficult advance. If morphine fails in the emergency, only Providence can bring quiet and ease.

Mechanical Measures. Of the mechanical therepeutic measures that can be applied to the failing or crippled cardiac mechanism, I have already mentioned the most important among the measures suggested with a view to obtaining cardiac rest. There is not one that will hinder or delay or bring to an end an already accomplished valvular lesion. It is even a question whether or not we can influence valvular disease effects once they are under process of formation. Nearly all of the procedures suggested will, however, assist in minimizing the resultant disease of the cardiac musculature, and aid in rendering the subsequent life of the patient more likely a bearable and useful one.

The *application of heat or cold* locally over the heart, or of heat, especially in the form of warm (not hot) oxygenated baths, if properly applied, is often of great service in restoring the balance of the cardiac mechanism. Even the Nauheim baths, and the Schott system of graduated exercises in carefully chosen cases may be of value. The first bath will nearly always indicate the advantage or disadvantage to be obtained. When the procedure renders the patient dyspneic and cyanotic and restless or induces collapse, instead of the bouyancy and tingling and uplift that should be gained, a second experiment had better not be ventured. I have not found, however, that any rule can be laid down for the choice of patient. One with extremely low and another with a distressingly high intravascular pressure may gain equal benefit from the brief warm, oxygen or CO_2 bath. On the other hand either or both may obtain only harm from such measures. It is probably safer to experiment with brief warm (100° to 105°) wet packs applied in the bed, before attempting the full endeavor with the tub.

General, judicious massage is one of the most valuable adjuvants of the other forms of treatment of cardiac disease. By assisting in a quiet way in the equalizing of the blood distribution, it often conduces appreciably to the removal from the weary heart of the overburden of obstruction in congested organs. The massage may consist of the veriest trifle in the form of exercise, or it may

be made vigorous enough to lead up to actual use of the limbs and body in the performance of their ordinary functions.

Bare mention need be made here of the effect of direct massage of the heart following collapse in surgical and other procedures. It forms rather a measure for the restoration of normal cardiac activity than for the treatment of cardiac disease. In the same manner cardiac surgery, apart from suture in the case of stab wounds, is still in the stage of laboratory experiment, and may only in the far distant future emerge into practicality and become more than a dream.

Counterirritation in the form of a blister over the precordium, is often a most valuable means of toning down and quieting an angry, nervous, cardiac action. Cupping never serves the same purpose, except when applied over the bases of congested lungs, when the relief to the embarrassed heart may be prompt and decided.

Bleeding (*venesection*) is indicated in cases in which the right heart is evidently laboring under a greater load than its already thinned and characterless walls, never very powerful, can carry. Both by lessening the total volume of the blood stream, and, indirectly, the accumulation in the lungs and in every other congested organ, venesection may withdraw just enough of the peripheral resistance to enable the cardiac muscle to recover its tone; yet there are many crippled hearts that need more instead of less blood for their own nourishment and exercise, and for the successful feeding of the rest of the body. Such a heart is that of mitral stenosis, or of the far less frequent tricuspid obstruction. To bleed such a patient before the stage in which the right heart has become engorged, or one of any form of high grade aortic disease, will neither prove safe nor rational, nor will it be rewarded by gratifying results.

Electricity is occasionally of great benefit, especially in the form of a weak galvanic current, applied directly over the precordia, the patient lying directly over one pad. Here, again, the experiment must be tested and the repetition based upon the result in the form of benefit or distress in the individual case. I have

more than once seen an apparently dead human heart resume its action under the light application of the electric brush, and make at least a creditable, even if usually a losing, endeavor to resume the performance of its function.

Finally an occasional *lavage of the bowel* with hot saline or sodium bicarbonate solutions has often proved a positive stimulant for failing vital forces, among them the heart. Given high up in the intestine, with the hips well elevated, and at the rate of approximately a quart in a half-hour, they seem not only to quiet dyspnea, but to regulate the uncertainty of action in a failing cardiac mechanism, probably furnishing through the salt, an additional tone to the vessel walls, including those supplying the heart fibers, and by furnishing both heat and fluid to a circulation that is suffering from a shortage of both.

Finally a word or two with respect to

Drug Treatment. I enter upon this phase of the subject with considerable reluctance. Surely in no other pathological field is the list of drugs so devoid and empty of one or more that will certainly accomplish the desired result. Of course the reason is plain. In mild and gradually developing cardiac disease drugs are not needed and had far better be let alone. Hygienic measures will accomplish every benefit that can be obtained. In cases of advanced cardiac disease the muscle of the heart is, in most instances, beyond responding more than feebly to any controlling tonic or nourishing influence. Probably more benefit can be obtained from *belladonna* (in the form of the alkaloid, *atropin*) than from any one other medicament. As an active cardiac stimulant, and yet at the same time in no way an irritant, atropin serves the double purpose of invigorating relaxed and tired fibers, and of encouraging competent respiratory action. In addition it seems to exercise an inhibitory influence over the conditions that tend to edematous infiltration of the lungs. If any drug can appreciably assist an attempt at rehabilitation on the part of the heart, atropin is that one. I believe, however, that we have no medicament competent to initiate that attempt, and that the heart that is incapable of undertaking the beginning of its own restoration is

little likely to be aided by atropin or any other remedy. On this basis we may rapidly enumerate the very brief list of drugs that have withstood the test of the era of therapeutic nihilism that has just swept by. With regard to the helpfulness of morphine as a cardiac tonic and sedative I have already expressed myself at such length that I will not venture to repeat. Digitalis and strophanthus are valuable when a long, steady pull is possible, and when there is no urgency on the score of the imminent dissolution of the patient. Both drugs contain principles that often cause their rejection by the stomach; digitalis showing this tendency more often than strophanthus. The action of both is exerted primarily upon the ganglia and the musculature of the left ventricle, directly increasing the power of the latter. By means of digitalis the diastolic pause between the successive contractions of the heart can be lengthened, and early arrhythmic tendencies set aside. Digitalis on occasion also acts remarkably well in those interesting, and now easily recognized cases, auricular flutter and auricular fibrillation. McKenzie goes so far even as to say that by the controlling action or non-action of digitalis in supposed instances of these conditions is proved the correctness of the diagnosis, so sure does he consider the drug to act in their presence. I cannot say that my own experience has fully borne out the infallibility of either digitalis or strophanthus in auricular flutter or any other feature of cardiac delirium and distraction. The derivatives digitalin and strophanthin are also of occasional utility. It is of interest to note the gradual departure of cardiac therapeutists from their belief that digitalis, especially when administered by the mouth, exerts any appreciable influence in contracting peripheral vessels or in raising intravascular pressure. In the laboratory and in healthy animals this reaction can always be obtained. At the bedside, and in the exhaustion of a toneless circulatory system, the influence of the drug is so slow as to be tedious, and so doubtful as to deserve not too great a measure of advance praise.

Spartein is one of the more helpful of the second division of really valuable drugs. Strychnine, especially when the stomach will tolerate large doses of the tincture of nux vomica, is often a

bulwark in time of need. The aklaloid is usually administered in too large doses and over such long periods of time that the patient is prone to suffer from an accumulated store. Camphor, caffein, and ammonia are all cardiac whips, and their influence is gone almost as soon as it has been exerted. Theocin will often appear to benefit until the congested stomach rebels. In cases in which the kidneys are an important pathological factor the vomiting will not be long postponed, or the renal damage remain a matter of doubt. Of the cardio-depressant class of drugs, including alcohol, nitroglycerin, veratrum viride, and aconite, little need be said except that they are not of benefit in genuine cardiac disease. Occasionally in a case of high systolic pressure, as in a sthenic patient with the great left ventricle and the water hammer pulse of aortic insufficiency, aconite will both quiet the cardiac overaction and dilate the vessels at the periphery. It is a treacherous drug, however, and the patient who is under its influence requires careful observation and watching.

In closing I would have it known that I am in no way endeavoring to belittle the influence of drugs in cardiac disease. On occasion they may serve the purpose intended. I do wish, however, to emphasize the fact that the hospitals record hundreds of instances of cardiac decompensation, converted into full cardiac competence without the assistance of a grain or a drop of a drug. I have so often watched, side by side, two or more seriously ill cardiac cases, seemingly identical, the one treated with a shower of medicaments by an incorrigible interne, and the other spared all save the restful tonics of internal good housekeeping, fresh air, and a scrupulous "letting alone,"—and have so regularly seen the race to convalescence won by days of time by the drug-spared patient that I am beginning to wonder, at last, whether in grave cardiac cases we had not better, as a routine, forego the temptation to "give something," for fear of a seeming inaction.

On the other hand, in syphilitic cardiac disease mercury, the iodides, and perhaps salvarsan, are at once indicated. In presenting the cardiopathies of dipththeria, enthusiasts are suggesting massive doses (even 300,000 units and more) of the

antitoxin. In malarial toxemias and cardiac affections quinine and arsenic and iron are of course in demand. These few instances of specific drug therapeutics would almost render one reluctant to return to the general run of cardiac insufficiencies, in which we must admit that the best and most successful treatment does not rest its case upon the administration of medicaments, if it were not that, after all, we have the privilege of relying upon the faculty, possessed by most human hearts, of recuperating spontaneously from very rude shocks and blows. In the hospital wards we are daily astounded by the recoveries of hearts that seemed hopelessly forlorn. We have gradually learned to say to the interne, as well as to ourselves, "Hands off; only hygienic meddling here!" The valuable lesson learned has been one of willingness to attribute at least a small portion of our success in these cases to Providence and to the inherent tendency of the human heart to regain its tone.

TREATMENT OF POLIOMYELITIS BY OPERATIVE MEASURES[1]

THE RESULTS ILLUSTRATED BY A CASE

By GWILYM G. DAVIS, M.D., M.R.C.S. Eng.

The literature of medicine and surgery has become so voluminous that it is difficult for a person to keep informed as to its status even in a single subject. This being true, it is obviously impossible for those engaged in the practice of general medicine and surgery to be acquainted with the advances made in all the various special departments. This is especially so in the domain of treatment, which often changes radically in short periods of time. The general practitioner of a few decades ago, whether of surgery or medicine, was qualified to give the best advice because the field was comparatively restricted, but at the present time it is extremely difficult to cover a wide field with any degree of thoroughness, and unless the greatest care is taken, the practical handling and treatment of cases is apt to suffer. Orthopedics, as a specialty, has arisen during the period of my own experience, yet it already has a large literature and easily commands one's entire time and attention.

One of the subjects in which progress has been most marked is that of infantile paralysis or acute poliomyelitis. Much has been learned about its etiology and natural history, but it is especially to its treatment that we desire to call attention. Not many years ago the treatment of the affection consisted of electricity, massage, and braces; rarely a tendon was divided. Of recent years, however, operative surgery has opened a new

[1] Read November 5, 1913.

field of aid for these paralytics, and it is because a good example of what can be done for them by operative means came to my notice that it was considered worth while to present the patient to the College as an illustration of what can be done for this class of cases. As a rule, at present, operative measures are reserved as a late procedure and resorted to only when further improvement or restoration of muscular power is not to be expected. For the first two or three years after the onset of the paralysis the improvement in function of the paralyzed parts is progressive, but it finally comes so nearly or quite to a standstill that radical measures of treatment are justifiable. I strongly suspect, as we become more experienced and better informed as to what can be done and what results can be achieved by operative procedures, that they will be resorted to earlier than is now considered advisable. Apparatus is used during what may be called the period of reconstruction, only as a temporary measure. In some of the paralyses recovery ensues while the apparatus is worn. In such cases operations are not needed, but eventually, in many cases one is confronted with the necessity of either the patient wearing an apparatus indefinitely or of so arranging the limb anatomically that it can fulfil its purpose without apparatus.

The problems are intricate and involved and are usually met by operations on the bones and joints which limit and restrict their movements, or operations on the tendons and muscles which tend to restore the balance of the affected parts. Each individual case is a puzzle in itself and has its own special indications. It is for this reason that apparatus can no longer be prescribed with the freedom, and I might almost say, thoughtlessness, that it was a few years ago. A child should not be condemned to wear a brace unless it is necessary. We are looking to the future of the child, and an unnecessary brace is a decided detriment to its mental development. It advertises to the world that the child is a cripple. This is one reason why the modern orthopedic surgeon no longer desires to apply braces, but rather seeks to avoid them and operative surgery aids him in so doing. It

often takes, however, a long time to determine the value of an operative procedure, and it is wise to look back occasionally and see the ultimate result of what has been done. The case here presented is only one of many, but it was an exceedingly troublesome one, entailing endless care on both the parents and surgeon:

The patient, a boy, now aged thirteen years, was paralyzed at the age of one year. The parts involved were the lower part of the trunk and left lower extremity. The paralysis was extreme. The back was partly affected, also the region of the hip, and almost all muscles of the thigh, with the exception of the biceps or external hamstring and one or two of the muscles moving the foot. The limb was suspended flail-like from the

Osteotomy, arthrodesis, transplanting of biceps femoris and the fascia lata.

trunk and flexed and collapsed as soon as pressure came upon it. There was extreme outward rotation of the foot, and as he grew older a knock-knee developed. He wore braces for seven years. By these it was endeavored to prevent the foot from everting or twisting in the shoe and the toes from dropping and catching while walking. The loss of the quadriceps femoris was met by the use of elastic bands, and a hip-band served to

correct the external rotation. It was thought best not to use a brace for the back, as in these cases of extensive paralysis freedom of the trunk is often essential for the purpose of maintaining the balance.

The boy was very active, and during the period of wearing the braces they were a constant source of annoyance, trouble, and expense. He was, as is not infrequently the case in paralytics, both active and rough, and his braces were in continual need of repair, being bent or broken a large part of the time. The use of braces was finally so unsatisfactory that it was decided to see whether by operative means sufficient support could be provided so that they could be dispensed with.

The first operation was an osteotomy of the femur. This allowed the knee of the affected side to extend more fully and corrected the knock-knee condition which was marked. This operation was done in December, 1910. In the following March an arthrodesis, or fixation of the ankle-joint, was done to fix the flail foot; the biceps femoris tendon was loosened from its attachment on the fibula and inserted into the top of the patella; and while the foot was strongly inverted, the fascia lata was slit in a longitudinal direction and sewed fast with silk sutures behind the greater trochanter. He wore a brace for a while until the various operative wounds had well healed, then discarded it, and his walking has improved ever since.

The fixation of the ankle eliminated movement at that joint, also to a considerable extent at the joint between the astragalus and os calcis. The midtarsal joint in front of the ankle not being interfered with, allowed the anterior part of the foot to droop somewhat, but not enough to allow the toes to catch in walking. The lateral movement of the foot was also eliminated to a sufficient extent to remedy the tendency to valgus. The transplanted biceps muscle can be seen to contract perfectly and holds the knee back in walking, so that it does not tend to collapse when weight is put upon it. The holding of the thigh in a position of internal rotation by fastening the fascia lata to the posterior edge of the greater trochanter corrected the outward turning of the foot in walking. This operation (devised by the writer[1]) was performed

[1] American Journal of Orthopedic Surgery, 1911, p. 72.

with silk buried sutures. Some of these eventually worked their way out through a sinus; hence the scarring which is present. Now, however, chromicized catgut is used and no trouble is experienced on that score. The result of the various operative procedures is that the boy no longer needs braces and can now get along without apparatus. The foot is held in approximately the normal position, and it is not necessary for him to put his hand on his thigh and push his knee back in walking, as was the case previously. He now goes to school, and his course of treatment is ended instead of being carried on indefinitely, as would have been the case had no operative procedures been attempted. His walking is much better than it was, and it is still improving.

DISCUSSION

Dr. J. Torrance Rugh: I do not believe that a case of greater importance could have been presented to the College by any of the orthopedic surgeons. Dr. Davis has shown in this case some of the advanced work that is being done in the orthopedic world with this most troublesome class of cases, and he has shown here about as good results, I believe, as one can possible obtain. There is still some dispute as to the relative value of some of these procedures, as, for example, the arthrodesis at the ankle-joint. That operation in the hands of a great many surgeons proves entirely inadequate. They find it extremely difficult to secure fixation by removal of the articular cartilages. Prior to the use of arthrodesis, we endeavored to hold these feet in the proper position by shortening the tendons, but we always found that the muscular structures, or what was left of them, the deteriorated structure, would stretch and in one or two years the foot would again assume the deformed position. I had the opportunity, in Italy, of seeing Professor Putti do an operation which to my mind takes the place of arthrodesis for the ankle-joint and especially in cases of this type. Professor Putti performed one of his own operations for me, showing this method of fixing the foot by operating upon these tendons from the opposite end. We always took the insertion of the tendon and shortened at that part. He separates the anterior tendons from the muscles high up on the leg. Then a hole is drilled through the tibia and the tendon ends are drawn through this hole and fastened subperitoneally in front of the tibia, some of the tendons being passed through from one side, and others from the other side. In this way he

shortens the tendons and leaves purely tendinous structure between attachment and insertion, and the tendon acts as a ligament and will not stretch. It is the badly degenerated muscle tissue which stretches. If there is sufficient contractive power on the part of the posterior tendons the anterior ones can be shortened and the foot maintained in the proper position, or if there are live muscles anteriorly, the posterior tendons are shortened in the same manner, and the necessity of an arthrodesis is avoided.

The utilization of any of the live muscles is of the greatest importance and the demonstration given here in the transferred power of the hamstring tendons is one of the best examples of what can be done in these cases.

Of course, the operative measures in these cases should not be undertaken until one is sure that complete regeneration, or all the regeneration that is possible, has taken place and that there is no possibility of return of power in these muscles. Then we may with safety and with great advantage in some instances transfer these muscles. Not until about six years after the onset of the paralysis should operative measures be instituted.

Dr. William J. Taylor: I can only congratulate Dr. Davis upon the wonderfully good results obtained in the use of this modern method of treating these otherwise hopeless cripples.

Dr. Charles K. Mills: I am deeply interested in this really brilliant case, but have nothing to say, except to compliment the surgeon. I have been—especially in the last two or three years—much interested in the question of different operations for the relief of the residual paralysis of poliomyelitis, particularly in the operation of tendon transplantation. Success is not always met with from the very nature of operations of this sort. I do not remember ever having seen a case in which the results were so satisfactory as in this instance, and Dr. Davis is to be much congratulated.

Dr. Davis, closing: It was not my intention to bring before you a case that was interesting from a purely orthopedic standpoint, although it would be interesting to discuss the details of Professor Putti's method of operation on the ankle-joint, etc. I did, however, desire to exhibit a case which was practical, a badly crippled patient, one who had been wearing apparatus *ad nauseam*, and to show that if one is willing to take the time and trouble, a great deal can be done for such patients. Oftentimes, as in this case, these people can be enabled to walk entirely without apparatus. This special boy was selected because he happened to combine in his own person paralysis of three different parts of the body: the foot, the knee, and the hip.

RESEARCH STUDIES IN PSORIASIS

A PRELIMINARY REPORT[1]

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AND

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FOR two thousand years physicians have been familiar with the clinical appearances of psoriasis. Much is known of its symptomatology, its course, its diagnosis, its histopathology, and not a little concerning its local treatment; of its cause and nature, however, we are in ignorance. Auspitz remarked some years ago, "Was Psoriasis ist, weiss bis heute noch kein Mensch."

Through the philanthropy of a generous donor, we have been enabled to inaugurate at the Philadelphia Polyclinic and College for Graduates in Medicine, a research investigation into the nature and treatment of psoriasis.

It is obvious that a research into the nature of a disease should be prosecuted without preformed judgments and with a mind free to receive impressions from the results of experimental work. In the investigations that have been carried out no attempt has been made to prove any theory of the causation of

[1] Read in abstract before the Thirty-seventh Annual Meeting of the American Dermatological Association, Washington, D. C., May 6 to 8, 1913.

The article is printed in full with numerous tables in the Jour. of Cutaneous Dis., New York, October and November, 1913.

Read November 5, 1913.

psoriasis. Two lines of inquiry were outlined—one bacteriological and pathological, and the other physiological-chemical; the work in each department has been carried out with the dominant thought of recording the findings, whether they proved to be of a positive or a negative character. In this manner it is hoped that some illumination may be shed upon a disease concerning whose nature the widest divergence of opinion exists, and yet of which we know definitely no more than did Hippocrates.

Metabolic Studies

THE CARE OF THE PATIENTS

All the experiments were performed under the strictest rulings that are necessary for exact metabolism studies.

The patients were kept in private rooms at the Polyclinic Hospital, which were located on the same floor as the laboratory. The patients were under the nursing care of Miss Julia Dorsey, whose valuable coöperation we take pleasure in acknowledging. In each room there was a set of utensils for the quantitative collection of the urine and feces. The urine was preserved with toluol and kept in glass-stoppered bottles. Each daily period was closed at the same hour of the morning. The feces were transferred to the laboratory as soon as passed. The weekly periods were marked off in the feces by the administration of charcoal.

Most of the patients spent the entire day in their respective rooms; some were permitted to go out once a day for a thirty- to forty-five-minute walk. In each case the patient had to report to the nurse.

Most of the patients were of an intelligent class, who understood in a general way the purpose of our studies and were perfectly willing to coöperate with us.

Special attention was paid to the quantitative collection of urine, especially in the female patients. They were instructed to void the urine before defecation, in order to avoid any possibility of loss while straining.

FOOD

One portion of the laboratory was converted into a kitchen. All of the food was prepared by the nurse and was weighed and recorded by one of the investigators before it was taken to the patients' rooms. The patients were required to eat all that was given to them. If, however, any food was not eaten by the patient, it was brought back to the laboratory and weighed and subtracted from the recorded amount.

Samples were taken for analysis of all the foods that were prepared. They were analyzed for their nitrogen content and, in many cases, the sulphur and phosphorus were also determined. Of the foods prepared outside the laboratory, as bread, large enough loaves were obtained to last for several days or a week. An analysis was made of each individual loaf. Butter was analyzed at the beginning of the investigation, and was found to contain such a small quantity of nitrogen, and the individual samples varied to such a small extent, that it was not deemed advisable to continue analyzing it, and we accepted the average figure obtained, namely, 0.12 per cent., as the amount of nitrogen in butter.

Foods eaten raw, as lettuce, pears, oranges, etc., were not analyzed in our laboratory. The figures in "Bulletin 28 of the U. S. Department of Agriculture," are very accurate and we used them as the basis of our calculations.

METHODS OF ANALYSES

The total nitrogen in the urine and food was determined by Kjeldahl's method.

Urea by Benedict's latest method.

Ammonia by Folin's method.

Uric acid by Folin's method.

Creatinin by Folin's method.

In these analyses we were assisted by E. M. Frankel and H. Dubin.

In the charts are recorded the daily analyses of the urine, the nitrogen content of the feces, the nitrogen in the food, the daily

FIG. 1.—Research patient No. 3. Miss B. L. Photograph taken December 12, 1912. (Courtesy of Jour. Cutan. Dis., November, 1913.)

nitrogen balance and the patient's weight.[1] Under "diet," we have given in detail the composition and character of the food

[1] The patients were weighed every day at 4 P.M. The clothing was weighed and its weight subtracted. In the charts the average weights for the week are given.

of the first day of each period. The variation from day to day, within a given period, was very slight; the main difference was in the vegetables.

FIG. 2.—Research patient No. 3. Miss B. L. Photograph taken March 10, 1913. Trunk free of eruption. Patient has been under dietary treatment; no internal treatment and no local treatment save the use of vaseline. (Courtesy of Jour. Cutan. Dis., November, 1913.

For the sake of brevity, only Research Case No. 3 is detailed at length.

Patient No. 3.—B. L.

Family History. Father died at the age of forty-two years; cause of death unknown. Mother living, aged thirty-nine years. No psoriasis in parents nor in two sisters and three brothers.

Fig. 3.—Research patient No. 3. Miss B. L. Photograph taken December 10, 1912. (Courtesy of Jour. Cutan. Dis., November, 1913.)

Personal History. Patient, aged eighteen years, was born in Russia. Had measles and diphtheria as a child; she has always been thin and sickly.

At the age of thirteen years, the patient first developed psoriasis. In 1909, while in Russia, she was treated in a hospital for her psoriasis, remaining in the institution four weeks; in 1911 she was again under treatment in the same hospital for eight weeks.

FIG. 4.—Research patient No. 3. Miss B. L. Photograph taken April 5, 1913, shows the persistence of a band-like streak of psoriasis. (Courtesy of Jour. Cutan. Dis., November, 1913.)

Present Condition. The patient was admitted to the Polyclinic Hospital on November 25, 1912, with an exceedingly severe and widespread eruption. She could scarcely walk because of the painful tension of the skin; the use of the arms was also considerably impaired.

On admission the patient exhibited a most extensive eruption, which was well nigh universal, save for the partial involvement of the face and extremities and partial exemption of the upper part of the back and chest. The eruption upon the trunk was of a rather superficial character; the scaling was most profuse, leading, during the first few days of her hospital sojourn, to the exfoliation of a quart Mason jarful of lameller scales per day. The skin was dry, tense, and here and there fissured, necessitating the use of vaseline as a lubricant to relieve distress and pain. Upon the arms and legs there were large, intensely red plaques, which were markedly thickened and elevated above the level of the skin. On admission, the eruption on the chest was limited by a sharp line of demarcation whose upper border was below the nipples anteriorly and extended across the shoulder blades posteriorly. The chest, abdomen, and back were the seats of a confluent area of psoriasis, somewhat suggesting in appearance a dermatitis exfoliativa. The scalp was diffusely involved and covered with scales.

This patient remained in the hospital for a period of five months.

Clinical Condition in Relation to the Dietary

Admitted Nov. 25, 1913.		Notes taken from record charts.
Nov. 27 to Dec. 10.	*High Nitrogen Diet* 18.63 gm. per day.	Dec. 2: "New papules have appeared on the upper part of the legs and arms." Dec. 6: "New papules upon the neck and upon the clear areas on the back." Dec. 8: "The eruption is spreading rapidly on the face."
Dec. 18 to Jan. 8.	*Low Nitrogen Diet* 6.89 gm. per day.	Dec. 25: "The skin is much smoother and paler." Jan. 7: "The skin is much paler in color and continuing to improve. The scales are finer and less bulky."
Jan. 9 to Jan. 21.	*High Nitrogen Diet* 20.54 gm. per day.	Jan. 23: "The feet are very red and the skin is much more inflamed on the lower part of the body."
Jan. 22 to March 3.	*Low Nitrogen Diet* 6 to 7 gm. per day.	Jan. 28: "The skin of the chest and upper portions of the arms and neck is paler." Feb. 1: "Pronounced improvement of the skin over buttocks, thighs, and legs." Feb. 5: "Entire body much paler and shows considerable improvement." Feb. 14: "Skin quite pale over greater part of body." Feb. 18: "Skin is smooth and white over upper part of body and neck." Feb. 24: "There have been no scales to collect for twelve days." March 3: "Skin over greater part of body free of eruption."

During the period of November 27 to December 3, 1912 (Period 1), the patient was placed on a diet consisting of an average of 18.63 grams of nitrogen per day—0.45 grams of nitrogen per kg. of body weight. The total amount of nitrogen received with the food for the entire weekly period was 130.4 grams. During this period the patient eliminated in the urine and feces 86.29 grams; which means that 44.11 grams of nitrogen were retained in the body during the weekly period, or 6.3 grams grams per day.

During the second week (Period 2) the patient was kept on approximately the same diet, with the result that 136.03 grams of nitrogen were ingested. The amount of nitrogen eliminated in the urine and feces during the corresponding period was 97.39 grams, which means that 38.64 grams of nitrogen were retained in the body—5.52 grams per day. The patient's gain in weight above the previous week was 0.52 kg.

It is at once evident that this patient presents a peculiar irregularity in regard to her nitrogen metabolism. A person of her weight on this diet should have established nitrogenous equilibrium long before the end of the two periods. It may be argued that 45 to 49 calories per kg. of body weight, which the patient received in her diet, was too high a caloric supply and is, perhaps, responsible for the nitrogen retention. But this objection is not valid, because the calories are calculated upon the basis of food that is *ingested*. We do not take into consideration the amount that passes through the intestinal tract and comes out in the feces, without having ever been resorbed and without having yielded any energy to the body. Rubner calculates the average feces of a well-fed individual to contain 8 to 10 per cent. of the gross caloric supply which, in establishing the actual caloric value of a diet, has to be subtracted. However, to eliminate all possibility of error, the patient was placed (Period 3) on a diet consisting of a gross caloric value of 37.9 calories per kg. per day and an amount of nitrogen which corresponds to a little less than the amount eliminated in the urine and feces during the first two periods. The establishment of nitrogenous equilib-

rium was certainly expected during this period. To our great surprise this did not occur. The nitrogen in the urine, instead of remaining at its former level, dropped down to an average of 6.32 grams per day. The total amount of nitrogen received during the course of this period was 83.51 grams. The amount of nitrogen eliminated in the urine and feces was 49.29. This means that there was a retention of 34.22 grams of nitrogen for the week, or 4.89 grams per day. The average weight of the patient for this period was 41.8 kg.—a gain of 0.43 kg.

During the first two periods marked nitrogen balances were observed in favor of the patient. The problem to be solved was: Is it a *bona fide* retention of nitrogenous material, or is it only an apparent retention, *i. e.*, is the nitrogen being given off in large quantities through a source other than the urine and feces? The only source of nitrogen loss that this patient presented was the skin. The patient's skin had been scaling since the beginning of the investigation. In this period we made a quantitative collection of the scales. During the course of the week 49 grams of scales were collected. The scales contained 11.22 per cent. of nitrogen, making a total of 5.5 grams of nitrogen for the week. As is seen, this is a small fraction of the retained nitrogen and fails completely to account for the positive nitrogen balance.

In Period 4 the patient was kept on the same caloric supply as in Period 3, but the nitrogen intake was again reduced to an amount less than was eliminated in the urine and feces during the third period, namely, an average of 6.89 grams per day. The patient failed to establish equilibrium even on this diet. Contrary to all expectations, the patient retained 1.87, 2.19, 2.16, and 1.69 grams during the first four days, respectively. These retentions are the more remarkable, since normally every change from a high to a low protein diet is associated with a negative nitrogen balance. The question then presented itself, In what form is the nitrogen retained? Is it retained in the form of the entire protein molecule, or in the form of end-products, as amino-acids or urea? It also became of great importance to test the kidneys' eliminative capacities, since it has been shown that in

conditions of nephritis, the patient's eliminative capacities for nitrogenous end-products may be very considerably interfered with, resulting in nitrogenous retention. We therefore considered it advisable to make a test, even though our patient showed no clinical evidence of kidney lesion. On December 22, therefore, 20 grams of urea, containing 9.33 grams of nitrogen, were added to the diet. Of this 8.16 grams were recovered in the urine of December 22 and 23. The total nitrogen elimination in the urine on December 22 rose to 10.97 grams. This experiment shows that the patient did not suffer from any kidney disturbance which might account for the nitrogenous retention and shows, further, that the patient does not retain the nitrogen in the form of urea, because the extra urea that was added to the diet was promptly eliminated. The total amount of nitrogen the patient received in her food during this period was, including the urea, 57.59 grams. She eliminated in the urine and feces 42.11 grams, which resulted in a positive nitrogen balance of 15.48 grams. There were 58.5 grams of scales during this period, 10.2 per cent. of which was nitrogen, equalling 5.97 grams of nitrogen. After subtracting this from 15.48, we still have a net gain in the body of 9.51 grams of nitrogen. The patient's average weight for the period was 41.35 kg., a loss of 0.45 kg. from the previous week.

In Period 5, the patient received the same diet as in Period 4, both quantitatively and qualitatively. No analyses were made during this period.

In Period 6 the same diet was maintained. On January 6, 20 grams of urea, containing 9.33 grams of nitrogen, were again added to the diet. Of this, 9.16 grams were recovered in the urine; almost quantitative elimination. The total amount of nitrogen ingested during this period was 43.62 grams; 42.5 grams of scales were collected, containing 10.66 per cent., or 4.53 grams of nitrogen. Again, we have a net nitrogen retention—in this case of 17.04 grams. In spite of this retention of nitrogenous material, there was a considerable loss of body weight. The average body weight for this period was 40.1 kg., a loss of 1.25 kg.

in two weeks. This indicates clearly that 38 to 42 calories per kg. of body weight was not sufficient to cover the patient's bodily needs. This fact makes nitrogenous retention the more remarkable. During these periods of low nitrogen diet the skin became much paler, smooth, and continued improving. The scales became finer and less bulky.

In Period 7 the patient was placed on a diet consisting of 20.54 grams of nitrogen per day, with an energy supply in the food of 53.6 calories per kg. of body weight. The nitrogen retention in the body during the two weeks was enormous, amounting to 66.1 grams in Period 7 and 60.94 grams in Period 8. A total retention of 127.04 grams of nitrogen in two weeks. If we subtract from this the 1.54 grams of nitrogen found in the scales of Period 7 and the 5.58 grams of nitrogen found in the scales and perspiration of Period 8, *there remains a positive nitrogen balance of* 119.88 *grams in a period of thirteen days.* A point of great significance in this connection is the fact that in spite of the retention of 66 grams of nitrogen—412.5 grams of protein—in Period 7, the patient's average weight for the period remained absolutely constant. During Period 8, however, there was a gain of 0.75 kg. We call special attention to this, because we shall later discuss the subject in detail.

When we analyze the daily relationship that exists between the ingested nitrogen—either in the form of urea or protein—and the daily nitrogenous elimination in the urine, we get an insight into the mechanism of the nitrogenous retention.

After the addition of urea to the diet, the nitrogen rise in the urine was very prompt—rising to almost 11 grams in one day. The addition of a much larger amount of nitrogen in the form of protein milk and meat resulted in a comparatively slight rise in the urinary nitrogen, the amount increasing slowly but steadily, for only on the sixth day did it exceed 10 grams. *This and also the following days show with what remarkable tenacity the patient's body holds on to the nitrogen of the protein.*

In considering all the sources of nitrogen excretion in a human individual, one must bear in mind that some nitrogenous material

is excreted through the skin with the perspiration. On January 17 the perspiration of the patient was collected as follows: She wore a suit of woolen underwear which had previously been washed in alcohol and dilute hydrochloric acid. This suit was worn for three days, January 17, 18, and 19. The suit was then washed in alcohol and dilute hydrochloric acid solution. The collected washings were evaporated and the nitrogen determined by Kjeldahl's method. For the three days there were found 1.02 grams of nitrogen (0.34 gram per day). During the two days following, January 20 and 21, 0.59 gram of nitrogen was collected in the perspiration (0.3 gram per day). These amounts are within the range of the normal and do not show any excessive nitrogen excretion through the skin.

During these two periods of high nitrogen diet and high nitrogen retention, the patient's skin became much more inflamed on the lower part of the body.

From the results thus far obtained we noticed a marked beneficial effect that the low protein diet produced on the course of the psoriasis, and that the high protein diet tended very strongly to stimulate the spread of disease; we therefore decided to keep the patient on a low protein and largely vegetable diet. In Period 9 the patient received a diet consisting of 44.3 calories per kg. of body weight, and 6.58 grams of nitrogen per day (0.164 gram of nitrogen per kg.). The total amount of nitrogen received in the food for the period was 46.08 grams. The amount eliminated in the urine and feces was 35.76 grams. During the three days, January 23 to 25 inclusive, 1.71 gram of nitrogen was collected in the scales and 0.86 gram in the perspiration, a total of 2.47 grams. When calculated for the week, we have 6 grams of nitrogen eliminated through the scales and perspiration. This leaves a net retention of 4.32 grams. The average weight was 40.15 kg.—a loss of 0.75 kg.

In Period 10 the diet was the same as in the preceding period, with regard to its nitrogen content, but it contained a lower caloric value—34.9 calories per kg., or 1381 calories per day. When we subtract from this value the caloric value of the unre-

sorbed food in the feces, which must have been high considering the high amount of nitrogen in the feces, and estimate the net caloric supply on the basis of the patient's body surface area, we find that this was a very poor diet as far as the energy supply was concerned. The patient's average weight was 39.6 kg.—a loss of 0.55 kg.—which means that the patient burned some of her own body fat. In spite of it all, however, *there was a marked and persistent nitrogen retention,* which amounted to 14.47 grams for the week, or 2.07 grams per day. Associated with this, there was plainly noticeable a marked and gradual improvement in the condition of the patient's skin. The amount of scales for the week was only 3.5 grams, with a nitrogen content of 0.386 gram.

In Periods 11 and 12 the same diet was continued with less than 7 grams of nitrogen in the food per day. The caloric value was raised, by the addition of 125 grams of cream and 100 grams of cornstarch, to about 1800 calories per day (46.4 per kg.). The patient's weight during Period 11 fell to 39.15 kg., a loss of 0.45 kg., but it returned to 39.6 kg. in Period 12. During the two periods the nitrogen balance persisted on the positive side to the extent of over 2 grams per day, which amounted to 16.75 grams for Period 11 and 17.46 grams for Period 12. There was no measurable scaling during these two periods and the perspiration collected during Period 12 contained only 0.708 gram of nitrogen.

These nitrogen retentions, extending over so long a period, are the very highest that have ever been recorded in human individuals kept on such a low protein intake.

In Period 13 53.3 grams of nitrogen were ingested and 38.99 grams were eliminated in the urine and feces, resulting in a retention of 14.31 grams of nitrogen. The average body weight remained constant.

In Period 14 40.84 grams of nitrogen were ingested and 34.69 grams were eliminated—a retention of 6.15 grams. The body weight was not recorded during this week.

During the last two periods (13 and 14), a normal individual,

Miss W., an employee of the hospital, was placed on exactly the same diet as was Patient No. 3. One of the objects of that experiment was to demonstrate the difference between the behavior of normal and psoriatic individuals with regard to the maintenance of nitrogenous equilibrium when on a diet of about 7 grams of nitrogen per day.

The difference is very striking. Whereas Miss W. showed a negative nitrogen balance during these two periods, *i. e.*, catabolized more than she ingested, Patient No. 3 showed a retention of over 20 grams.

This experiment presents several points of interest which will be taken up in a subsequent paper. *The most significant thing here is the fact that a psoriatic individual can retain nitrogen on a diet on which a normal individual fails even to maintain equilibrium.*

It is seen from the above that, without any local treatment, a severe case of psoriasis became almost entirely cleared during a period in which the diet was especially low in its nitrogen content. It was also observed that during the periods in which the nitrogen content in the food was high the disease spread considerably. These results led us to suspect that there was some intimate relationship between the protein content of the food and the severity of the disease. At this stage of the investigation the patient's skin "was free of eruption over the greater part of the body," and the scales were reduced to immeasurable quantities. We therefore decided to place the patient on a high protein diet with the object of testing the correctness of our supposition.

In Periods 15, 16, 17 and 18 the patient was kept on a diet similar to that of Periods 7 and 8. The average nitrogen intake per day was between 21 and 22 grams. The amount of nitrogen ingested in Period 15 was 150.77 grams. The amount excreted in the urine and feces was 105.99 grams—a retention of 44.78 grams per week or 6.4 grams per day.

The reader will please note the amount of urinary nitrogen in Periods 7 and 8 and compare them with those of Periods 15, 16, and 17. The highest amount eliminated then was 11.15 grams (on January 21); the nitrogen elimination in the latter periods

exceeded 17 grams per day. In Periods 7 and 8, when the disease was very active, the patient, on a diet of 20.54 and 21.07 grams of nitrogen per day, retained 11.02 and 8.79 grams of nitrogen for the two periods respectively.

In Periods 15, 16, and 17, when the activity of the disease was considerably checked and the patient's skin was rapidly improving, the administration of a diet similar to the above was accompanied by a retention of 6.4 grams per day in Period 15, 4.4 grams in Period 16, and only 2.36 grams in Period 17.

In Period 16 153.52 grams of nitrogen were ingested and 122.68 grams excreted in the urine and feces, resulting in a retention of 30.84 grams or 4.4 grams per day. The patient's average weight in this period was 41.6 kg.

In Period 17 150.79 grams were ingested and 134.24 grams excreted, resulting in a retention of 16.55 grams. The patient's average weight was 42 kg., a gain of 0.4 kg.

In Period 18 163.99 grams of nitrogen were ingested and 134.98 were eliminated in the urine and feces, resulting in a retention of 29.01 grams. The patient's average weight was 42.5 kg., a gain of 0.5 kg. On April 1, 20 grams of urea, containing 9.33 grams of nitrogen, were added to the diet. The nitrogen elimination in the urine rose from 16.2 to 25.05 grams. Of the urea nitrogen, 8.28 grams were recovered in the urine. This shows that, even on a high protein diet, the kidneys' eliminative capacity for the principal end-product of protein catabolism is not in any way disturbed.

Period 19 consisted of 10 days and was divided into halves. During the first half a very high protein diet was given, amounting to 28.08, 28.67, 27.22, 29.61, and 28.61 grams of nitrogen per day. During this period there were obtained the highest figures for eliminated nitrogen, the highest point being reached on April 10, when 23.85 grams of nitrogen were eliminated. The amount of nitrogen retained during these five days was 26.17 grams. On April 12 the nitrogen in the food was reduced to 5.64 grams. This low nitrogen diet was continued for the following four days, namely, 5.75, 5.73, 6.15, and 5.39 grams of nitrogen

per day. Contrary to our previous experiences, no equilibrium was established and the patient remained in negative nitrogen balance.

On April 16 the patient left the hospital.

SUMMARY OF RESULTS OBTAINED IN THE STUDY OF PATIENT NO. 3.

When we come to summarize the results obtained from a study of this case two important facts stand out prominently:

1. The very marked and persistent nitrogen retention throughout the entire course of the investigation.

2. The relationship that appears to exist between the amount of nitrogen in the food and the course of the disease.

Throughout the investigation of this case, which lasted 128 days, the patient ingested in her food 1816.29 grams of nitrogen. During this period she eliminated in the urine and feces, 1323.97 grams of nitrogen, which leaves a positive balance in favor of the body of 492.32 grams. To get the actual amount of nitrogen retained in the body we must subtract the amount of nitrogen given off in the form of scales and perspiration. The scales were collected in most of the periods in which exfoliation took place. Their analyses follow:

Period 1. Not analyzed. 6 grams of nitrogen assumed
" 2. Not analyzed. 6 grams of nitrogen assumed.
" 3. 5.50 grams of nitrogen.
" 4. 5.97 grams of nitrogen.
" 5. Not analyzed. 6 grams of nitrogen assumed.
" 6. 4.53 grams of nitrogen.
" 7. 1.54 gram of nitrogen.
" 8. 3.97 grams of nitrogen.
" 9. 1.71 gram of nitrogen.
" 10. 0.39 gram of nitrogen.

After Period 10 there was so little scaling that its collection became impossible. The total amount of nitrogen collected through the scaling was 23.6 grams. If we assume the maximum amount of nitrogen to have been lost in the scales of the periods in which no analyses were made, then the total amount of nitrogen thus lost would not exceed 51.6 grams.

The perspiration was collected during the period of January 17 to 19 and found to contain 1.02 grams of nitrogen—0.34 gram per day. During January 20 and 21, 0.59 gram was found—0.3 gram per day. During January 23 to 25, 0.86 gram was collected—0.29 gram per day. Between February 12 to 18, 0.71 gram of nitrogen was collected in the perspiration—0.1 gram per day. We are inclined to attribute the high figures in the first examinations to the inclusion of small particles of exfoliated epithelium in the underwear, which were analyzed with the perspiration (the patient scaled quite freely during that period), and are of the opinion that 0.1 gram per day is the more correct value for nitrogen loss through perspiration. We shall, however, accept 0.3 gram per day as the basis of calculation of the approximate amount of nitrogen lost through perspiration. In 128 days the patient could not have lost more than 38 grams of nitrogen in this way. When we add this to the 51.6 grams lost in the scales, we find a total loss of 89.6 grams through the skin. This leaves a net nitrogen balance of 492.3—89.6=402.7 grams. This amount of nitrogen must have been added to the patient's body during the course of this investigation.

From the above data it seems that this patient, who was suffering from a most widespread psoriasis, had a pronounced extension of the eruption under a relatively high nitrogen dietary during the first two weeks of her hospital sojourn (Fig. 1). After the inauguration of a low nitrogen diet the inflammation in the skin and the amount of scaling gradually became less. Later, a two weeks' regime of high nitrogen appeared to cause increased inflammation, the latter subsiding after the institution of a low nitrogen diet. From then on, under a prolonged low nitrogen dietary, the patient continuously improved, until, on discharge from the hospital, but a bare vestige of the eruption remained in a few isolated areas (Fig. 2). Curiously, a band-like streak of eruption (Fig. 4) on the left buttock and thigh, persisted for several months after the eruption had practically disappeared elsewhere. Under the continuance of the diet prescribed after the discharge of the patient, this band practically faded away.

While the trunk in Fig. 1 exhibits a very superficial type of the disease, there were large, thickened, and intensely hyperemic patches on the extremities.

During the last few weeks of the patient's hospital sojourn she was placed upon an increased nitrogen diet, without any material aggravation of the eruption; at this time, however, although she still retained nitrogen, the amount of retention was less than during any previous period of high nitrogen diet.

These patches all disappeared without the use of any active medicament. Vaseline was used on the eruption to alleviate the excessive dryness and tension, which gave rise to the keenest distress to the patient. No other local treatment and no internal treatment was employed whatsoever.

Patient No. 4.—N. N.; male, aged thirty-three years; born in Russia. He does not recall the diseases of early life. He served four years in the Russian Army, during which time he suffered an attack of jaundice lasting five weeks. He never had rheumatism. No history of psoriasis in parents or any other member of the family.

Present Condition. The patient is short and thick set; height, five feet, six inches; weight, 143 pounds. The first attack of psoriasis was experienced seven years ago; he has suffered pretty constantly with more or less eruption since then.

The patient was admitted to the Polyclinic Hospital on December 26, 1912. On admission, he exhibited extensive figurate psoriasis covering a considerable portion of the cutaneous surface. The scalp was markedly involved and a broad band of eruption extended to a depth of one inch around the frontal border of the hair. The eyebrows and mustache were also the seat of eruption. The chest and abdomen exhibited huge, diffuse patches covering about two-thirds of the surface. The back, from the nape of the neck to the sacrum, was almost completely covered by a huge, single, unbroken patch. The only free areas were the right scapular region, the left shoulder, and the lateral aspects of the lumbar region. The patient complained of tenseness and impaired suppleness of the skin, which caused pain and bleeding. The patches were of a deep-red color, palpably elevated, and covered with a moderately thick layer of scales.

The arms and legs were beset with a number of psoriasis plaques, varying in diameter from a pea to the palm of the hand. The nails, both of the hands and feet, were severely affected, showing marked subungual

thickening and pronounced pittings. Under a low protein diet the patches gradually lost their infiltration and subsided to the level of the skin.

The patient was under the necessity of supporting his family and was able to remain only a limited period of time in the hospital (seven weeks). He was discharged on February 13, 1913.

Under the use of a chrysarobin ointment, 20 grains to the ounce of vaseline, applied two weeks before his discharge, the eruption rapidly improved and, without any interruption, progressed to the point of disappearance.

Examined on March 30, 1913, the entire surface of the face, scalp, trunk, arms and legs was free of the eruption, save for a few ill-defined and superficial, scaly areas on the sacrum and legs. The nails exhibit a marvelous improvement, having lost their thickening and showing, in their new proximal portion, healthy nail tissue.

No treatment was applied to the scalp; no internal treatment whatsoever was employed. The patient after discharge from the hospital faithfully continued the diet prescribed for him.

On January 1, 1913, the patient was placed on a diet consisting of a little more than 7 grams of nitrogen per day. The total amount of nitrogen ingested during Period 1 (8 days) was 67.72 grams. The amount of nitrogen eliminated in the urine and feces was 62.41 grams, resulting in a positive balance of 5.31 grams. During the period 9.5 grams of scales were exfoliated from the skin, 11.19 per cent. of which was nitrogen, equalling 1.06 grams which has to be subtracted, leaving a net gain to the body of 4.25 grams. The patient's average weight for the period was 64.9 kg. The caloric value of the food was about 1860 calories, or about 28 calories per kg. of body weight.

On January 6, 20 grams of urea, containing 9.33 grams of nitrogen, were added to the diet. Of this, 8.2 grams were recovered during the days of January 6 and 7.

In Period 2 the patient was placed on a diet consisting on an average of 27.06 grams of nitrogen per day, with a caloric value of 2670 per day, or 41.2 per kg. The total amount of nitrogen ingested in the period was 162.37 grams. The amount eliminated in the urine and feces was 105.48 grams; 3.5 grams of scales were collected, containing 0.39 gram of nitrogen, which leaves a

net retention of 56.5 grams of nitrogen. The average weight of the patient for the period was 64.8 kg.—a loss of 0.1 gram.

Here we have a tremendous retention of nitrogen, corresponding to 353 grams of pure protein, while the patient is on a rich caloric supply, without any gain in body weight. This is very remarkable, for the same observation was made in Patient 3, Period 7.

In Period 3 the patient was kept on approximately the same diet, receiving 194.77 grams of nitrogen (an average of 27.82 grams per day) and about 2800 calories per day. The amount of nitrogen eliminated in the urine and feces was 147.62 grams. In 3 grams of scales there were found 0.34 gram of nitrogen. This leaves a positive nitrogen balance of 46.81 grams. The patient's average weight was 65.8 kg.—a gain of 1 kg.

In Period 4 the nitrogen in the diet was reduced to an average of 7.04 grams per day. In this case the change in diet from high to low protein caused a negative nitrogen balance which persisted for about three days. Beginning with the fourth day, the nitrogen balance became positive and remained so until the end of the investigation. The total amount of nitrogen ingested during the course of the week was 49.27 grams. The amount eliminated in the urine and feces was 51.51 grams and 0.25 gram was found in the 2.2 grams of scales which were collected during the period. This leaves a net loss to the body of 2.49 grams. The average body weight was 65.4 kg.—a loss of 0.4 kg.

In Period 5, the diet given contained the same amount of nitrogen as did the diet in the preceding period, but with a lower caloric supply, namely, 1471 calories per day, or 22.7 per kg. The amount of nitrogen ingested was 49.66 grams. In the urine and feces, 39.17 grams were eliminated and 0.17 gram in the scales. This leaves a retention of 10.32 grams. The patient's average weight was 65 kg., a loss of 0.4 kg.

In Period 6 the diet was the same as regards its nitrogen content, but it was of a higher caloric value, 2017 calories per day, or 31.2 per kg. The total amount of nitrogen ingested was 52.63 grams. The amount eliminated in the urine and feces was 40.91 grams, resulting in a positive nitrogen balance of 11.72

grams. The patient's average weight was 64.7 kg., a loss of 0.3 kg.

On February 11 the patient left the hospital.

SUMMARY OF THE RESULTS OBTAINED IN THE STUDY OF PATIENT NO. 4

The patient presented a case of psoriasis of more than ordinary severity. The results obtained in this case are in absolute agreement with those obtained with Patient No. 3. The patient presented some remarkable peculiarities in his protein metabolism: (1) in being able to store nitrogen easily, even when receiving only 7 grams per day, with a caloric supply of only 22.7 grams per kg.; (2) in being able to store tremendous quantities of nitrogen when on a high protein diet; and (3) in showing improvement in the condition of his skin when on a low protein diet.

During his stay of forty-two days in the hospital, the patient ingested 576.42 grams of nitrogen. He eliminated in the urine and feces, 447.1 grams. This leaves a positive balance of 129.32 grams. Severe as the case was, the amount of scaling was comparatively slight.

The following amounts of nitrogen were found in the collected scales for each of the periods:

Period 1	1.06 gram
" 2	0.39 "
" 3	0.34 "
" 4	0.25 "
" 5	0.17 "
" 6	0.00 "

The total amount of nitrogen eliminated in the scales for the entire period of investigation was 2.21 grams. When we add to this the amount of nitrogen lost in the perspiration (assuming 0.3 gram per day, which equals 12.6 grams for the entire period) the total amount of nitrogen eliminated through the skin could not have exceeded 14.8 grams. As the positive balance over the urinary and fecal nitrogen amounted to 129.32 grams, on sub-

tracting 14.8 grams, we find a net retention of 114.5 grams of nitrogen, an amount which is present in 716 grams of protein.

Patient No. 5.—H. B.; male, aged forty-seven years; born in the United States.

Family History. His father died at the age of seventy-five years. For ten years he had a large ulcer in the groin. For four or five years prior to his death he had a "generalized scaly eczema," so diagnosed by a well-known dermatologist. His mother is living and well at the age of seventy-seven years. No other members of the family ever had any skin trouble.

Previous History. The patient has been married twenty-two years. His wife is living and well. The first pregnancy resulted in miscarriage. There are three children, all well and robust; the eldest is nineteen years old. The patient had measles and scarlet fever in childhood. He had gastritis at the age of nineteen years and jaundice on several occasions. He is subject to "bilious attacks." He has been constipated for the past ten or twelve years. At the age of twenty years he had a "chancroid," which lasted about four weeks and was treated with local applications only; he never had any manifestations suspicious of lues. In 1908 a böil-like lesion began below the left knee, which grew to a plaque about 2 inches in diameter and became elevated above the skin about $\frac{1}{4}$ to $\frac{1}{2}$ inch, with a papillomatous surface; a diagnosis of sarcoma was made. In 1910 an operation was performed to remove the growth, but it was found to extend too deep. A month later the leg was amputated above the middle of the thigh. Enlarged glands developed seven months later (May, 1911) in the left groin, and were excised; the wound failing to heal, a second operation was performed on the glands in July, 1911, with successful result. No microscopic examination of the growth appears to have been made.

Present Disease. The patient first developed psoriasis seventeen years ago, and has never been free from the eruption since then. He has usually had large areas of the body covered. The eruption is worse in winter and usually better in summer.

The patient was admitted to the hospital on January 16, 1913. On admission he exhibited a most extensive eruption, covering the face, scalp, trunk, and extremities. The face was in large part covered with superficial, reddish patches, particularly in the bearded region. The trunk, which is shown in Figs. 9 and 11, was the seat of extensive, irregular patches, which were considerably infiltrated and covered with heavy scales. The legs and arms were enveloped in extensive, thickened patches, which involved about two-thirds of the area of the extremities.

The patient was on a high nitrogen diet for five days from the date of admission; during this period the eruption on the face became distinctly worse; this was independently commented upon by the physician in attendance, by the nurse and by the patient's sister.

Fig. 5.—Research patient No. 5. H. B. Photograph taken January 25, 1913. (Courtesy of Jour. Cutan. Dis., November, 1913.)

Later the patient was placed upon a low nitrogen diet and kept upon this diet for the greater period of his hospital sojourn. The patient was discharged from the hospital on February 28, 1913. At this time a vast improvement was evident in the eruption. Large areas of the body had become pale and were relatively free of eruption. To properly appreciate the extent of improvement, attention is directed to Figs. 5, 6, 7, and 8. The interval elapsing between the taking of the photographs was about seventy days.

The scalp, which was very scaly on admission, cleared up without any remedial application whatsoever. The patient received no internal treatment, and nothing was used locally except occasionally a little vaseline to relieve the excessive dryness and tension.

FIG. 6.—Research patient No. 5. H. B. Photograph taken April 5, 1913. Dietary treatment. No internal treatment and no local measures save the occasional use of vaseline. (Courtesy of Jour. Cutan. Dis., November, 1913.)

On February 25, owing to a positive Wassermann reaction, an intravenous administration of salvarsan was given without any appreciable influence upon the eruption.

On January 17 the patient was placed on a diet consisting of an average of 27.79 grams of nitrogen and about 2700 calories per day (38.7 calories per kg.). The amount of nitrogen retained on the first day of that diet was 9.8 grams. High nitrogen retention continued throughout the entire period. The total amount of nitrogen ingested during the period (five days) was 138.93

grams. In the urine and feces, 104.35 grams were eliminated; 21.5 grams of scales were collected, 11.12 per cent. of which was nitrogen, equalling 2.39 grams of nitrogen. This leaves a net retention of 32.19 grams of nitrogen. The average body weight was 70.2 kg.

FIG. 7.—Research patient No. 5. H. B. Photograph taken January 25, 1913. (Courtesy of Jour. Cutan. Dis., November, 1913.)

In Period 2 the patient was placed on a diet consisting of an average of 13.45 grams of nitrogen and an energy supply of about 2500 calories per day (36 calories per kg.). During this period the patient ingested 94.12 grams of nitrogen. He eliminated 82.32 grams in the urine and feces. During the period, 64 grams of scales were collected, containing 7.35 grams of nitrogen. This leaves a positive nitrogen balance of 4.45 grams. The average body weight was 69.4 kg., a loss of 0.8 kg.

In Period 3 the nitrogen in the diet was reduced to almost half that of the preceding period, an average of 7.26 grams per day (0.106 gram per kg.). The caloric value of the food was about 1600 per day (23.3 calories per kg.). The change from the high to the low diet was associated with a negative nitrogen balance, which lasted for four days of the period. During the last three days there was a positive balance.

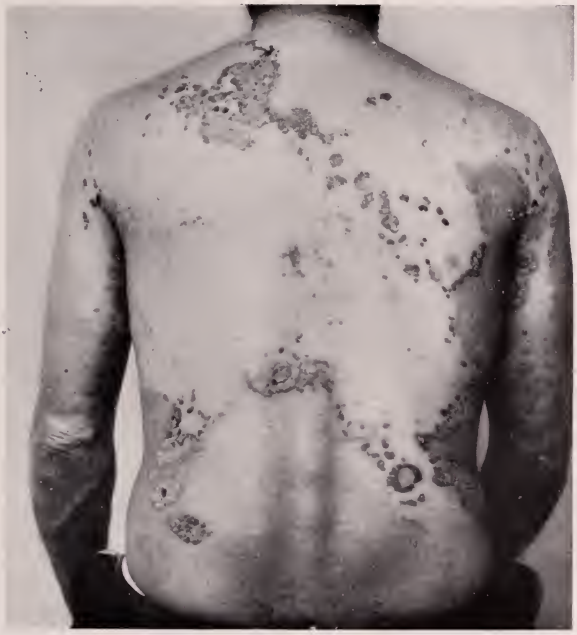

FIG. 8.—Research patient No. 5. H. B. Photograph taken April 5, 1913. Dietary treatment. No internal or external treatment save the occasional use of vaseline. (Courtesy of Jour. Cutan. Dis., November, 1913.)

When we consider the balance for the week we are surprised to find that the patient almost reached nitrogenous equilibrium on this low diet. He ingested 50.84 grams of nitrogen and excreted 51.54 grams, a loss of only 0.7 gram. Only 1.5 gram of scales was collected during the period. The patient's average weight was 68.6 kg., a loss of 0.8 kg.

The establishment of nitrogenous equilibrium on a diet con-

taining only 0.106 gram of nitrogen per kg., and an energy supply that is a great deal less than is required for the maintenance of caloric equilibrium and which is associated with considerable loss in body weight, again show what a remarkable tenacity these patients' bodies have for protein.

In Period 4 the diet consisted of approximately the same amount of nitrogen, but of a higher caloric value—2100 per day (30.8 calories per kg.). The amount of nitrogen ingested was 54.18 grams; the amount excreted was 43.16 grams. 7.5 grams of scales were collected, but no analysis was made. Since none of this patient's scales were found to contain more than 12 per cent. of nitrogen, the 7.5 grams of scales could not have contained more than 0.9 gram of nitrogen. The net gain to the body in nitrogen for the period was, therefore, 10.21 grams. The patient's average weight was 68.2 kg., a loss of 0.4 kg.

It is remarkable to note at what a low level of nitrogen catabolism this patient lived. The average elimination of nitrogen in the urine per day was 5.14 grams. Calculated per kg. of body weight, we find that only 0.0754 gram of nitrogen was catabolized per kg. of body weight.

In Period 5 the patient received a diet of about 2600 calories and an average of 8.23 grams of nitrogen per day. The total amount of nitrogen ingested was 57.58 grams. In the urine and feces were eliminated 45.13 grams, giving a positive balance of 12.45 grams of nitrogen and a gain of 0.1 kg. in weight.

In Period 6 the same diet was continued, but of a lower caloric value. The patient lost 0.4 kg. in body weight, but retained 16.28 grams of nitrogen.

On February 25 the patient left the hospital.

SUMMARY OF RESULTS OBTAINED IN THE STUDY OF PATIENT NO. 5

This patient, like Patients 3 and 4, possessed the ability to store nitrogen when on a very low protein diet. During the course of his stay in the hospital, the patient retained 86.83 grams of nitrogen, but lost 2.3 kg. of body weight.

PATIENT No. 8.—M. C.; aged twenty-seven years; female; born in Italy.

Family History. Her mother died at the age of sixty-four years, of unknown cause, and her father at the age of thirty-five years, of heart disease. The patient is unable to recall any facts relating to the history of illness in her early life.

Previous History. She is married and has had five children. The first pregnancy terminated in a miscarriage at seven months. The second child is living and well and has been personally examined to verify this fact. The third pregnancy miscarried at five months. The fourth child died when eighteen days old. The last child is living and well. The patient had a positive Wassermann of moderate degree.

Present Disease. The patient has suffered from psoriasis for four years. She was admitted to the Polyclinic Hospital on April 22, 1913.

At this time she was suffering from a severe and widespread psoriasis involving the face, trunk, and extremities (Figs. 9 and 10). The eruption covered the greater part of the face and scalp and involved, in thick nummular plaques, about three-quarters of the cutaneous surface. A great amount of scales was thrown off every twenty-four hours; the patient complained of painful dryness, tension, and fissuring, which required the use of vaseline for its relief. There were deep fissures about the knees, elbows, and finger-joints. The fingers were held in an extended position and could not be bent on account of the accompanying pain.

The patient remained in the hospital forty-nine days and was discharged at her request on June 6, as her presence at home was demanded.

This patient had a most severe, inflammatory, and extensive eruption. Seldom does one see a more widespread eruption, unless the psoriasis is a diffuse, universal one. The patient complained bitterly of soreness of the skin and pain from the fissures, particularly those about the knees, elbows, and fingers. She is very sensitive to cold.

The patient was placed on a low nitrogen diet on April 23. By May 1 improvement was noticed in the skin and the subjective symptoms were much relieved. The scaling, which had been very profuse, had considerably lessened by May 9. Vaseline was applied as infrequently as possible, without subjecting the patient to unnecessary distress. A note made on May 10 states that "vaseline has not been applied for three days." By May 10 the skin over the breasts and shoulders had become much paler.

By reference to Figs. 9 and 10, the improvement in the eruption between April 23 and May 21 (the dates of the respective photographs) is clearly seen. In view of the fact that no internal treatment whatsoever was employed and no

Fig. 9.—Research patient No. 8. M. C. Photograph taken April 23, 1913. (Courtesy of Jour. Cutan. Dis., November, 1913.)

local treatment save the use of vaseline, the change, we believe, is truly remarkable. This improvement continued up to the date of her departure. After discharge from the hospital the patient was unable, owing to poverty and other causes, to continue the

diet prescribed, and she returned to the hospital some weeks later with the eruption much aggravated.

In Period 1 the patient was placed on a diet consisting of an average of 6.84 grams of nitrogen and 1439 calories per day

FIG. 10.—Research patient No. 8. M. C. Photograph taken May 21, 1913. Dietary treatment. No internal or external treatment except the use of vaseline. (Courtesy of Jour. Cutan. Dis., November, 1913.)

(22.8 calories per kg.). During the period she ingested 47.9 grams of nitrogen. She eliminated 34.62 grams in the urine and 4.67 grams in the feces. This leaves a positive balance of 8.61 grams. 41 grams of scales were collected, containing 4.95 grams of nitrogen. On subtracting this from 8.61, we find that on this

poor diet the patient retained 3.66 grams of nitrogen. The patient's average weight was 63.1 kg.

In Period 2 the patient was placed on a diet lower than the preceding one in its caloric and nitrogen content. It contained an average of 6.08 grams of nitrogen and 1150 calories per day (about one-half the normal requirements). The total amount of nitrogen ingested was 42.55 grams. The amount eliminated in the urine and feces was 37.85 grams. 65 grams of scales were collected, containing 8.23 grams of nitrogen. This leaves a negative nitrogen balance of 3.53 grams. The patient's average weight was 60.6 kg., a loss of 2.5 kg.

In Period 3 the diet consisted of an average of 7.08 grams of nitrogen and 1553 calories per day (26.42 calories per kg.). During the period 49.59 grams of nitrogen were ingested. Only 25.26 grams were eliminated in the urine (3.61 grams per day). 6.4 grams of nitrogen were found in the feces and 11.2 grams in the scales. This results in a net nitrogen balance of 6.73 grams in favor of the body.

On May 10 500 c.c. of milk, containing 2.51 grams of nitrogen, were added to the patient's diet. As is seen from the chart, the extra protein caused no increase in the nitrogen elimination. The patient's average weight was 58.8 kg., a loss of 1.8 kg.

In Period 4 the same amount of nitrogen was administered as in Period 3, but the diet contained a higher caloric value (36.5 calories per kg.). During the period 52.45 grams of nitrogen were ingested. *Only* 20.29 *grams of nitrogen were eliminated in the urine, i. e.,* 2.89 *grams per day.* 14.03 grams of nitrogen were found in the feces, and 8.83 grams in 66 grams of scales that were collected during the period. This leaves a positive nitrogen balance of 9.3 grams. The patient's average weight was 58.5 kg., a loss of 0.3 kg.

On May 18 1000 c.c. of milk, containing 5.05 grams of nitrogen, were added to the diet. In normal conditions this would have caused a considerable, if not a corresponding, rise in the output of urinary nitrogen. In this case there was no increase whatsoever. The significance of this will be discussed later.

In Period 5 approximately the same diet was maintained as in the preceding period. The period consisted of nine days, in which 70.12 grams of nitrogen were ingested. During this period the patient eliminated 40.57 grams of nitrogen in the urine and feces. 114 grams of scales were exfoliated, 14.4 per cent. of which was nitrogen, equalling 16.42 grams. This leaves a net nitrogen balance of 13.22 grams in favor of the body. The patient's average weight was 58.15 kg., a loss of 0.35 kg.

On May 22 100 grams of sweetbread were added to the diet. This meant an additional ingestion of 3.54 grams of nitrogen, or a total of 10.65 grams. The amount eliminated in the urine was only 3.4 grams of nitrogen, an increase of less than 0.7 gram above that of the preceding and following days.

On May 27 the patient was given 20 grams of glycocoll (Kahlbaum), containing 3.74 grams of nitrogen. 2.75 grams of extra nitrogen appeared in the urine of May 27 and 28. All of the extra nitrogen was eliminated in the form of urea. There was no increase in the undetermined nitrogen. Almost 1 gram of the glycocoll nitrogen was retained in the system.

From the foregoing two very significant facts stand out prominently: First, the very large amounts of nitrogen that may be lost through the skin in exfoliated epithelium (scales); second, the small amounts of nitrogen eliminated in the urine. In Period 4 the daily average urinary nitrogen amounted to 2.89 grams; in Period 5 it was 2.78 grams (excluding May 22, 27, and 28, when special substances were fed). *These are the very lowest amounts of nitrogen that have ever been found in the urine of an individual of that weight.* In Period 6 we wished to find out the lowest level that the urinary nitrogen can be reduced to. We therefore reduced the nitrogen intake to an average of 4.39 grams per day. The total nitrogen intake for the week was 30.7 grams. 13.78 grams of nitrogen were found in the feces. The amount of nitrogen eliminated in the urine sank to below 2 grams per day. *Only* 13.16 *grams of nitrogen were eliminated in the urine for the period—an average of* 1.88 *grams per day.* 84 grams of scales were collected, in which were 8.75 grams of nitrogen.

The nitrogen balance for the period was as follows:

Ingested	Excreted			Balance	Body weight
	Urine	Feces	Scales		
30.7	13.16	13.78	8.75	—4.99	—0.25 kg.

We believe that this experiment throws a great deal of light on the mechanism of protein metabolism in patients with psoriasis, and we shall return to this later.

At this point we wished to place the patient on a nitrogen-free diet, but, to our great disappointment, family affairs required her immediate return to her home. On June 6 she left the hospital.

SUMMARY OF RESULTS OBTAINED IN THE STUDY OF PATIENT NO. 8

In this patient, as in the preceding ones, a marked tendency to nitrogen retention was noted. The lowest figures for urinary nitrogen (1.88 grams per day) were observed in this case, when the intake was reduced to a little less than 4 grams.

During the course of the investigation, which lasted forty-four days, 293.4 grams of nitrogen were ingested. The amount excreted was 210.63 grams, resulting in a positive balance of 82.77 grams. 446 grams of scales were collected, in which were 58.38 grams of nitrogen. The detailed study of this case shows very clearly to what a marked extent the condition of the skin may influence the urinary nitrogen (see Period 6).

PATIENT NO. 9—J. H.; female; single; aged eighteen years.

Family History.—Her father was killed by an accident six years ago, at the age of forty-one years; previous to the accident he had always been in good health. He had had psoriasis on the leg, when a young man, before he was married. Her mother is living, aged forty-five years, in poor health; she complains of stomach trouble; she has had rheumatism for the last three years; she is free from skin diseases.

An uncle, the mother's brother, had psoriasis seven years ago and was treated in the Jefferson Hospital of Philadelphia. An aunt by marriage had psoriasis in 1912; the attack lasted five weeks; she was treated by a

specialist and has not seen any sign of the psoriasis since September, 1912. The patient has three brothers living, aged fourteen, seventeen, and twenty-one years, respectively, free from skin disease; one sister is dead.

Personal History.—The patient was born in Roumania; she has resided for the last ten years in the United States; she worked hard at sewing; her appetite is poor, and the meals are irregular. The meals usually consist of two eggs daily, meat once a day; one glass of milk and one or two slices of bread daily, cocoa occasionally. No wines, tea, coffee, or alcoholic drinks. The bowels were usually constipated until she was operated on for appendicitis in the German Hospital in 1912. The patient has had measles; the date of the attack is not recalled. Her menses began at the age of fourteen years. She had erysipelas in February, 1913. She has suffered from headaches since she was nine years of age.

Present Illness.—The patient states that the cutaneous trouble started four years ago, at the age of fifteen years. She first noticed a red scratch on the left shoulder; then papules started on the right shoulder and elsewhere. She was treated in the Jefferson Hospital Dispensary in 1912.

The patient was admitted to the Polyclinic Hospital on May 12, 1913. She presented plaques of psoriasis of varying size upon the trunk and extremities. The plaques were not numerous, but were large in diameter and considerably infiltrated. An extensive psoriatic belt, having almost the shape of an abdominal binder, extended around the lower part of the abdomen; this area of psoriasis was very scaly, thickened, and elevated above the surrounding healthy skin. Scattered plaques were present upon the arms and legs.

Vaseline was applied to the eruption to relieve the distressing tension and fissuring. The eruption improved, but did not disappear by the date of the conclusion of the metabolic studies on this patient. Chrysarobin, in ointment form, was thereupon applied, with a resulting disappearance of the patches.

In Period 1 the patient was kept on a diet consisting of an average of 6.4 grams of nitrogen and 1643 calories per day (30.5 calories per kg.). The total amount of nitrogen ingested during the period (eight days) was 56.18 grams. The amount excreted was 56.84 grams. During the period 46 grams of scales were collected, containing 6.23 grams of nitrogen. The net nitrogen balance was, therefore, 6.89 grams. The patient's average weight was 53.96 kg.

On May 18 1000 c.c. of milk, containing 5.05 grams of

nitrogen, were added to the diet. Less than one gram of extra nitrogen was eliminated in the urine. The rest was retained.

In Period 2 an average of 7.04 grams of nitrogen and 2317 calories were given per day. On May 22 100 grams of sweetbread, containing 3.54 grams of nitrogen, were added to the diet. On that day there was an increase of one gram in the urinary output of nitrogen. The rest was retained in the system.

On May 27 20 grams of glycocoll, containing 3.74 grams of nitrogen, were added to the diet. The nitrogen elimination in the urine was 3.8 and 3.98 grams on May 25 and 26 respectively. It rose to 6 and 5.95 grams on May 27 and 28, and came down again on May 29 to 4.12 grams. There were eliminated 3.67 grams of extra nitrogen, which is almost quantitative elimination. A glance at the column of undetermined nitrogen, however, reveals the fact that not all the glycocoll was catabolized. The undetermined nitrogen, which was fairly constant—0.57 and 0.53 grams per day—rose to 0.93 and 1.31 on May 27 and 28 respectively, to fall again to 0.48 gram on May 29. While all the glycocoll found its way to the urine, only 2.53 grams were eliminated in the form of urea and 1.14 grams were eliminated, in all probability, unchanged.

The total amount of nitrogen ingested during the period (9 days) was 70.67 grams. In the urine and feces there were eliminated 53.1 grams, and in the scales there were found 5.27 grams of nitrogen. The total output amounted to 58.37 grams, resulting in a net positive balance of 12.3 grams. The patient's average weight was 54.53 kg., a gain of 0.57 kg.

In Period 3 the nitrogen intake was reduced to an average of 4.28 grams per day The total amount of nitrogen ingested during the period was 30.04 grams. The feces of this period was found to contain 13.54 grams of nitrogen. The amount of nitrogen eliminated in the urine was 20.94 grams, or 2.99 grams per day. The nitrogen excreted in the urine and feces, therefore, exceeded the ingested nitrogen by 4.44 grams. In the 21 grams of scales collected there were 2.47 grams of nitrogen. This results in a net loss to the body of 6.91 grams of nitrogen. The average

weight of the patient was 54.6 kg., a gain of 0.07 kg. (Patient No. 8 was kept on the same diet in Period 6. Note the difference in results.

In Period 4 the patient was kept on approximately the same diet as in Period 3, but with a higher amount of nitrogen, namely, 5.16 grams per day. The scaling diminished considerably during this period, so that only 2.5 grams of scales were collected.

The total amount of nitrogen ingested during Period 4 was 36.15 grams. The amount excreted was 30.47 grams, leaving a positive balance of 5.68 grams. The average weight of the patient was 54.54 kg., a loss of 0.06 kg.

The average amount of nitrogen eliminated in the urine per day was 2.47 grams. When we consider this amount in relation to the patient's weight we find that 0.0453 gram of nitrogen was eliminated in the urine per kg. of body weight. The question then presented itself, What is the lowest amount of nitrogen that this patient would eliminate, if placed on a diet as free from nitrogen as can be conveniently administered?

Our original intention was to place the patient on a diet consisting of carbohydrates and fats and free from nitrogen, the carbohydrates and fats in sufficient quantity to cover all the caloric requirements.

Experiments of this sort were first described by Landergren. He hoped to show that by keeping a man on a diet containing sufficient caloric value to cover all the energy requirements, but in a state of specific nitrogen hunger, that the lowest nitrogen catabolism compatible with life will take place. He found that during the first three to five days there was a gradual decline in the nitrogen output, which reached the lowest level on the fourth to sixth day, when it remained constant. The nitrogen eliminated at this time per kg. of body weight per twenty-four hours was 40 to 50 mg.

We planned to keep our patient on a diet similar to Landergren's, but we soon had to modify our plans on account of the monotony of the diet. The patient ate only a small fraction of the sago starch.

The experiment lasted for three days. On June 13 the patient received 0.87 gram of nitrogen in the food which had a heat value of 651 calories. On this day the patient eliminated 2.5 grams of nitrogen in the urine. On June 14 0.26 gram of nitrogen was ingested in the food, which had a heat value of only 440 calories. On this day 1.65 grams of nitrogen were eliminated in the urine. On June 15 0.32 gram of nitrogen was ingested in the food, which had a heat value of 611 calories. The amount of nitrogen in the urine was 1.67 grams. At this point we were forced to abandon the diet because of its monotony.

While the experiment was not as complete as originally planned, it nevertheless possesses considerable significance. On the second day of this diet the urinary nitrogen seems to have struck a level below which it did not go down. From the experiments of Landergren and others, we know that it takes at least three days to reach the lowest level of nitrogen catabolism. Our patient struck that level on the second day of the experiment. The amount of nitrogen eliminated in the urine per kg. of body weight was 0.0311 gram, showing to what an extent the patient's tissues were depleted of their reserve protein.

Patient No. 7.—R. A.; male; aged sixteen years; born in Russia.

Family History.—His father is living at the age of forty-two years. He is in good health. He had catarrh of the stomach for ten years. He has never had any skin disease. His mother is living and well at the age of forty-two years; she had an attack of rheumatism this winter (1913). She has been always free from skin disease.

He has two brothers, aged twelve and eighteen years, respectively, and one sister, aged eight years, who is in good health. Two brothers died in infancy; cause unknown. The brothers and sister are free from skin disease.

Personal History.—The patient has resided in Philadelphia for the last five years. He has worked quite hard in an upholstery factory. His appetite is good; he is well nourished; he is a moderate tea drinker. He has never indulged in alcoholic drinks or in coffee. He is very nervous; he had chorea in 1912. Always slept well until he had the attack of chorea, when he was very restless; he still shows signs of the muscular twitching of the face, back, arms, and abdomen. He had rehumatism at the age of fourteen years, and measles when two years old.

Present Illness.—He states that he was in Jefferson Hospital for treatment for chorea in March, and one month after admission to the hospital he noticed a red spot on the cheek (in the latter part of April). This was followed by a more or less generalized eruption. The psoriasis first appeared while the patient was taking arsenic for his chorea. He was free from psoriasis for two and a half months during October, November, and part of December. A second attack of psoriasis began in January, papules appearing on the forehead, then upon the body, legs, arms, and face. The patient states that during the first year the eruption was most pronounced in July and August. He was admitted to the Polyclinic Hospital on April 8, 1913. On admission the patient presented a number of psoriasis plaques from 2 to 4 cm. in diameter, scattered over the trunk and extremities; the eruption was only moderate in extent. There were numerous areas of brownish pigmentation at the site of previous psoriasis areas; the face was quite covered with psoriasis scales.

A neurological examination made by Dr. John Rhein yielded the following results:

No subjective sensory phenomena—outside of some itching. Station good. Knee-jerks slightly + and equal. Babinski absent. Plantar reflex normal. Abdominal reflex normal. Cremasteric reflex normal. Slight irregular tremor of both arms and hands, slightly increased on voluntary effort. No change in sensation. Some mild general choreiform movements present. Coördinates the hands well. Pupils react normally; they are equal. No ocular palsies. Some rotary and lateral nystagmus.

In the study of all the cases cited above a very marked and decided improvement was noted after the patient had been kept on a low protein diet. In all of our cases all medicinal treatment, internal as well as external, was omitted. There remained only two factors which might have influenced the course of the psoriasis in our patients. First, the sojourn in the hospital, with its hygienic environment, and, secondly, the regime of the low protein diet. We therefore decided to keep Patient No. 7 on a high protein diet, varying from period to period between 23.7 grams of nitrogen per day, to 38.65 grams of nitrogen per day. Our object was to discover to what extent the sojourn in the hospital alone influenced the course of the psoriasis.

In Period 1 the patient was placed on a diet consisting of an average of 24.89 grams of nitrogen per day. The heat value

of the food was about 2600 calories per day, or 47.8 calories per kg. The total amount of nitrogen ingested during the period (twelve days) was 298.64 grams. The amount excreted was 244.48 grams, resulting in a positive balance of 54.16 grams of nitrogen. The average body weight was 54.9 kg.

Fig. 11.—Research patient No. 7. R. A. Photograph taken April 10, 1913. Stains of former eruption present. (Courtesy of Jour. Cutan. Dis., November, 1913.)

In Period 2 approximately the same diet was continued. During the period (ten days) 237.11 grams of nitrogen were ingested and 208.38 grams were excreted, leaving a positive nitrogen balance of 28.73 grams. The average body weight was 55.4 kg., a gain of 0.5 kg.

In Period 3 (7 days) the nitrogen intake was raised to an average of 30.59 grams per day. The total amount ingested during the period was 214.10 grams. The amount excreted was 177.77 grams, leaving a positive balance of 36.33 grams. The

caloric value of the food was about 2900 calories per day, or 52.7 calories per kg. The patient's average weight was 55.3 kg., a loss of 0.10 kg.

In Period 4 the average nitrogen intake was 27.36 grams. During the course of the period (nine days) 246.27 grams of

FIG. 12.—Research patient No. 7. R. A. Photograph taken May 21, 1913. Patient kept on *high nitrogen diet*. The patches, by actual measurement, have increased in size, and new lesions have appeared. (Courtesy of Jour. Cutan. Dis., November, 1913.)

nitrogen were ingested. The amount eliminated in the urine and feces was 210.77 grams, leaving a positive balance of 35.50 grams. The average weight of the patient was 55.7 kg., a gain of 0.4 kg.

In Period 5 the nitrogen intake was raised to an average of 38.65 grams per day. The total amount ingested during the period (seven days) was 270.58 grams. In the urine and feces were eliminated 218.43 grams, which leaves a positive balance of 52.15 grams. The patient's average weight was 56.5 kg., a gain of 0.8 kg.

In Period 6 an average of 26.09 grams were ingested per day. The total amount for the period was 182.66 grams. The amount excreted was 143.98 grams, leaving a positive balance of 38.68 grams. The patient's average weight was 56.3 kg., a loss of 0.20 kg.

In Period 7 197.90 grams of nitrogen were ingested, *i. e.*, an average of 28.27 grams per day. The amount eliminated in the urine and feces was 157.10 grams, leaving a positive balance of 40.80 grams.

This case has a special interest, inasmuch as the patient was used partly as a clinical control for the other patients. In order to determine whether psoriasis would improve as a result of the physical and mental rest incident to sojourn in a hospital, irrespective of the character of the diet, the patient was not placed on a low nitrogen dietary, but, on the contrary, was given a high nitrogen intake. After a few weeks' residence in the hospital, there was a pronounced improvement in the patient's nervous condition; the choreiform movements were distinctly less marked. No improvement, however, took place in the psoriatic eruption. *Indeed, under this high nitrogen diet, the psoriasis plaques gradually increased in size and some new patches appeared.* After a number of weeks many of the patches began to clear in the centre and became circinate. The patient remained in the hospital from April 8 to July 1, a period of 84 days, and at the end of this time the psoriasis was worse than upon admission. The relative appearance of the eruption on April 10 and on May 21 is seen in Figs. 11 and 12. The increase in the size of the patches was verified by actual measurement.

Before discharge from the hospital, a chrysarobin ointment was applied and the eruption gradually disappeared.

DISCUSSION OF RESULTS

From the study of the cases presented above the following conclusions may be drawn.

1. That these patients possess a strong tendency to store nitrogen.

2. That the nitrogen is stored with great ease.

3. That on a low protein diet the patients may eliminate extraordinarily small quantities of nitrogen in their urine.

4. That a low protein diet has a distinct and a remarkably beneficial influence on the course of the psoriasis.

5. That very large quantities of nitrogen may be lost through the skin in the form of scales.

6. That on a high protein diet tremendous quantities of nitrogen may be retained in the system.

7. That a high protein diet, although it did not bring about a relapse in a case where the active process had been checked (Patient No. 3, Period 15), did stimulate very considerably the course of the existing psoriasis in active form (Patient 3, Periods 7 and 8; Patient 5, Period 1, and Patient 7).

8. That the retention of nitrogen is not always associated with a corresponding gain in body weight.

For the sake of convenience we shall divide the discussion of our results into several chapters:

THE VALUE OF THE ELIMINATED NITROGEN IN THE INTERPRETATION OF PROCESSES OF METABOLISM

In the ordinary studies of protein metabolism two kinds of nitrogenous end products are taken into consideration.

1. Urinary Nitrogen. This represents the amount of nitrogen eliminated as urea, ammonia, creatinine, uric acid, purin bodies, and other individually undeterminable nitrogenous compounds, which may consist of amino-acids and peptides, which managed to filter through the kidney before they were completely catabolized. All these are cleavage and end products of protein metabolism.

2. Fecal Nitrogen. The fecal nitrogen consists of two fractions: (1) Nitrogen secreted and excreted in the form of

ferments and otherwise by the epithelial cells of the mucous membrane of the intestinal tract, which may be considered a true product of cell metabolism of the intestinal wall and (2) nitrogen of the unresorbed food, which has never played any part in the body metabolism.

In some experiments the nitrogen of the perspiration and normal skin exfoliation is also taken into consideration. Their values, however, are so small that for all practical purposes they may be neglected.

In the introductory chapter it was stated that for the estimation of the protein that is catabolized by an individual, it is necessary to determine the amount of nitrogen eliminated in the urine and feces and to multiply that figure by 6.25, which is the ratio between nitrogen and protein. It is evident that while this method permits of a very accurate study of the nitrogen and protein balances, our inability to distinguish and separate the two fractions of fecal nitrogen may cause the introduction of considerable error in the study of the quantity of protein that is actually catabolized by the cells of the body. The reader will, therefore, always bear in mind that the actual nitrogen metabolism of the cells of the body is less than is expressed by the sum of urinary and fecal nitrogen, or, in other words, the nitrogen of the food that is resorbed and takes part in the cell metabolism is less than the amount ingested.

In the study of the cases presented above a third and very important factor of nitrogen has to be taken into consideration, namely, the nitrogen found in the scales of the skin. Analysis of the scales has shown that they contain from 9.92 to 14.4 per cent. of nitrogen. They also contain sulphur and phosphorus and we have every reason to believe that they consist primarily of protein. This being the case, we must include the nitrogen thus eliminated in the calculation of our balances, but we must not include that nitrogen in the calculation of the body protein catabolism. The nitrogen has its own history in the body economy, and, as will be shown later, exerts a tremendous influence on the metabolism of the psoriatic patient.

NITROGEN RETENTION IN PSORIASIS

When we come to examine the character and extent of the nitrogen retention in the psoriatic patient, in the light of the aforesaid, we cannot fail to observe the similarity that obtains between the behavior of the psoriatic and that of the convalescent, with reference to the ease with which each can store nitrogen in large quantities and for long periods of time.

The continuous storing of nitrogen in Patient No. 3 resembles Benedict and Suranyi's cases in almost every particular.

The retention of 2.5 grams of nitrogen per day in Patient No. 8, Period 3, when receiving an average of 7.08 grams of nitrogen and only 26.4 calories per kg., is almost an exact duplication of Friedrich Müller's case, which was certainly in a very bad state of undernutrition.

When we add to this our experience with the superimposed milk feeding of 500 and 1000 c.c., fed in addition to a standard diet and our failure to find any evidence of catabolism of this extra nitrogen in the urine, we feel inclined to believe that *patients with severe psoriasis present a state of remarkable protein undernutrition*, which we choose to call "specific nitrogen hunger." Because of this nitrogen hunger, they possess the power of retaining nitrogen to a most marked extent, even under conditions in which a normal individual would find difficulty in maintaining equilibrium.

The following questions now present themselves: Wherein is the cause of this "nitrogen hunger" to be sought? What is the relationship between the psoriatic lesion and the nitrogen hunger? What causal relationship may they bear to each other? Then, what becomes of the retained nitrogen, where does it go, and in what form is it retained?

Answers to these questions may be found in an analysis of the results obtained in Patient No. 8, in Patient No. 9, and in the pathological histology of the psoriatic lesion.

Patient No. 8 lived in the hospital under our observation for a period of forty-four days. During this period she ingested

293.4 grams of nitrogen. For the same period she eliminated in the urine and feces 210.6 grams, leaving an apparent positive nitrogen balance of 82.8 grams. There is no doubt that this nitrogen is retained in the form of protein. The question is, Where is it retained?

To properly understand this point, we must recognize a very important series of facts which deal with the pathology of psoriasis. Disregarding the differences of opinion that exist with regard to the seat of the primary lesion of psoriasis, all are agreed that there are evidences of inflammation in the papillary layer of the corium and that the rete mucosum is hyperplastic. *The epithelial cells proliferate with great velocity, push toward the surface, become cornified, and are finally exfoliated.* The chief constituent of these epithelial cells are proteins, which must be obtained by the cells from the blood. To realize the extent to which this proliferation may occur, and to appreciate the amount of protein that may thus be removed from the blood and ultimately from the cells of the body, we shall state that during her stay in the hospital we collected 446 grams of scales, exfoliated by this patient's skin, and this amount does not represent the full amount of scaling, for a quantitative collection is almost impossible in a case like this, because of the fineness of the scales and the difficulty of collection. The nitrogen content of the collected scales varied from 11.8 to 14.4 per cent. *Almost pure protein.* The total amount of nitrogen in the scales was 58.38 grams. We have no idea how much nitrogen this patient lost through the scales before she came to the hospital. Judging from the amounts we obtained the total loss must have been enormous.

In what way does the loss of nitrogen in the scales influence the total nitrogen metabolism of the body? This question is answered very clearly in the following experiment:

Patient No. 8, who scaled very profusely, and Patient No. 9, who scaled only moderately, were placed on the same diet during the period of May 30 to June 5. The figures for the week follow:

Patient	Weight	Nitrogen ingested	Nitrogen in feces	Nitrogen in urine	Nitrogen in scales	Net nitrogen balance
No. 8	58.4	30.70	13.78	13.16	8.75	—4.99
No. 9	54.6	30.04	13.54	20.94	2.47	—6.91

The amount of nitrogen ingested and the amount of nitrogen in the feces were similar in these patients, but there was a great difference in the amounts of nitrogen in the scales. Patient No. 8 lost 6.28 grams more in the scales than Patient No. 9 did, and she eliminated 7.78 grams less in the urine. *If we assume the nitrogen in the urine to represent the end-products of protein metabolism of the cells of the body, we see very clearly to what an extent the condition of the skin influences the total protein metabolism. The proliferation and rapid growth of the epithelial cells of the skin deprive the cells of the body of their nutrient material and force them to subsist at a starvation level. During the course of the week only* 13.16 *grams of nitrogen were eliminated in the urine, an average of* 1.88 *grams per day, or* 0.0323 *gram per kg. of body weight. This is the very lowest figure that has ever been reported for an individual under similar conditions of nutrition.*

The proliferation and growth of epithelial cells takes place throughout the entire period of the disease, commencing, in all probability, long before exfoliation begins. For this growth of cells, protein is required, which is abstracted by the multiplying epithelial cells from the blood stream, in quantities proportional to the severity of the disease. This constant drain of protein from the body into the skin, where it becomes "fixed," gradually causes the impoverishment of the body in protein, producing a condition of "specific nitrogen hunger."

If at any time during this process a study of the protein metabolism is instituted, nitrogen retention will be evident. The retained nitrogen can go in one or in two places, depending upon the stage of the disease and upon the protein status of the patient. It may be carried to the epithelium of the skin to become incorporated in the proliferating cells and finally be given off as exfoliated scales, or it may be carried to the cells of the body, especially to the muscle cells, which have become impoverished of their protein. The nitrogen may be deposited in the muscle cells of a psoriatic patient, as it is in a convalescent patient after a prolonged illness. In both classes of patients a positive nitrogen balance takes place.

This theory seems to be in harmony with many of the facts and seems to explain the cause of the remarkable and prolonged nitrogen retentions.

INFLUENCE OF A LOW PROTEIN DIET ON THE COURSE OF PSORIASIS

On carefully reviewing the clinical histories of our patients, one cannot fail to notice that the low protein diet exercised a distinctly beneficial influence on the course of the disease. Conversely, a high protein diet had a strong tendency to exacerbate the condition.

How can we explain these relationships? In what way can we conceive of the low protein diet influencing the patient's skin?

Bulkley, who long ago recognized the favorable influence of a low protein or vegetarian diet on the course of psoriasis, endeavored to construct a theory of disturbed protein catabolism. He deserves credit for his recognition of the influence of various dietary regimes on the course of the disease. The analytical data, however, upon which his theory is based would not stand scrutiny in the light of modern scientific and experimental research.

We believe that the following consideration offers a satisfactory explanation:

One of the most prominent features of the histology of psoriasis is the rapid growth and proliferation of the epithelial cells of the skin. For the present we may leave out of consideration the primary etiological factor. But one thing must be clearly understood: For their growth and life, these cells require building material, which can be obtained from only one source—the blood and lymph streams. The principal building material required by these cells is protein. It is at once evident that since these cells are endowed with a powerful "growth impulse," "Wachstumstrieb," the velocity of their growth will be directly proportional to the amount of "building material" in the form of protein, that is placed at their disposal. A high protein diet, therefore, stimulates their growth, because it provides all the necessary components of the epithelial cells.

By keeping the patient on a low protein diet, on an amount just enough to cover the body's "wear and tear" quota, we bring about a condition in which no extra protein can be supplied to the rapidly multiplying cells of the skin. If the "growth impulse" of these cells were not so great, this point would, in all probability, mark the end of the disease. May it not be possible, therefore, that the rapidly growing cells in psoriasis, like those of malignant growths, have the power of preying on the rest of the body, withdrawing protein from the blood, and then the blood in turn attack the protein storehouses—the muscles? This may go on for a long time until the body's protein reserve is exhausted, when the growth of the epithelial cells, patches, and scalings becomes checked. A similar process has been described in the classic researches of Miescher. He found that during the salmons' migration up the Rhine they suffer from complete starvation. During this period their genital organs become remarkably proliferated, whereas the muscles lose up to 50 per cent. of their protein content. This is an illustration of the rapid growth of one tissue at the expense of another in a starving animal. The high "growth impulse" of the testicular tissue is the determining factor.

In the psoriatic patient the same thing may take place, but to a lesser degree. The epithelial cells of the skin keep on growing as long as there is "available" or "mobilizable" protein in the system. When this is exhausted, their growth is checked. *And this, in our estimation, may account for the frequent spontaneous improvements in cases of psoriasis.* By keeping the patient on a low protein diet, we hasten this point of "exhaustion." We hasten the slow starvation of the epithelial cells. By keeping the patient on a high protein diet, we stimulate the growth of the epithelial cells and thus delay improvement. (See Patient No. 7.)

We find additional support for this theory in the following clinical observations of S. Jessner: "Von altersher herrscht die Anschauung, dass die Psoriasis vornehmlich Kräftige, muskulöse, sonst gesunde Individuen befallt. Dies ist im allgemeinen richtig, wenn auch Ausnahmen nicht allzu selten sind. Zuweilen kann

man feststellen, dass bei kräftigen Personen eine vorhandene Psoriasis schwindet, sobald sie von einer schwereren Krankheit heimgesucht werden und Körperlich herunterkömmen. Erholen sie sich später, dann erscheint die Psoriasis wider auf die Bildflache."

Similar observations have been recorded by various writers who have reported the disappearance of psoriasis in patients suffering from acute infections, only to return after the infectious disease has subsided.

These facts lend support to our theory, because they show that every condition that is associated with increased protein catabolism or diminished protein ingestion results in improvement of the psoriasis.

An analogy was previously drawn between malignant growths and the growth of the epithelial cells in psoriasis. Biologically, the two seem to have a great deal in common. The difference appears to be one of degree only. Both are endowed with great growth impulse and power of proliferation, both have the power of living on and multiplying at the expense of the cells of the host. The difference between the two is that by exhausting the reserve depots of protein, the psoriasis will always be checked because its "growth impulse" is not as great as is that of the malignant tumors, which will go on growing until they bring about a toxic disruption of the cells of the host. Powerful as is the action of malignant tumors in this respect, it was recently shown by J. E. Sweet, Corson-White, and Saxon, in a beautiful research, that even the growth of adenocarcinoma of the rat and carcinoma of mice may be checked by an improper and insufficient protein supply.

THE RELATIONSHIP BETWEEN RETAINED NITROGEN AND GAIN IN BODY WEIGHT

On examining the influence of nitrogen retention on the body weight of our patients, we found that in most cases there was no relationship at all; that the retention of even large quantities of nitrogen may not be accompanied by any gain in weight.

On admission to the hospital Patient No. 3 weighed 40.85 kg. When she left after a stay of one hundred and twenty-eight days, she weighed 42.2 kg. During this period she retained a net amount of 402 grams of nitrogen, which is contained in 2512 grams of pure protein. Her body weight should have increased by at least that amount, leaving aside the amount of water that would be necessary to dissolve the protein to the consistency of the cell. A similar lack of proportion was found in Patients No. 4 and No. 5; but Patient No. 7, who was kept on a high protein diet throughout the course of the experiment, retained 286 grams of nitrogen—1.79 kg. of protein. During this same period the patient gained 1.4 kg. in weight.

Observations of this kind are not new in physiological literature. Bischoff and Voit recorded them as early as 1860, but that the lack of proportion could be as great as was observed in Patient No. 3 was most surprising.

Bischoff and Voit fed a dog on bread for forty-one days, and during this period the animal lost an amount of protein corresponding to 3717 grams of flesh. The total loss of body weight, however, was only 531 grams. The difference was made up by retention of water. As the animal's state of nutrition began to improve by the ingestion of 1800 grams of meat per day, the water was rapidly eliminated. The results obtained on the first day of meat feeding are very interesting. In spite of this tremendous food intake the animal lost 310 grams in weight and the urine itself contained 120 c.c. more water than was ingested.

Very striking, also, is Lüthje and Berger's experiment No. 3, in which their subject received food with a fuel value of 72 calories per kg., and 49.6 grams of nitrogen per day. The amount of nitrogen retained per day was 11.4 grams and the amount of fat that was stored must have amounted to at least 200 grams per day. In the first four days there was a retention of at least 800 grams of fat and 285 grams of protein, 1085 grams of material in all, and in spite of this retention, the subject's weight was 0.6 kg. less than when the experiment started.

This lack of relationship between an actual gain in body material

and a failure to show it in a gain of body weight, can be accounted for by assuming a variation in the amount of water in the tissues. That the relative amount of solid material decreases in muscle tissue in starvation, was shown definitely in Rubner's laboratory.

The following changes were found in the muscle of fasting animals:

	Normal		Fasting	
	Solid	Water	Solid	Water
	22.87	77.13	18.73	81.27
	23.65	76.35	17.99	82.01
Average	23.26	76.74	18.36	81.64

This table shows very plainly that in starvation the relative amounts of water may increase very considerably. Of course, we must bear in mind that our patients did not suffer from any deprivation of food, but from specific nitrogen hunger. What the influence of this condition may be on the water content of the cells will be the subject of our inquiry in the immediate future.

RÉSUMÉ OF THE CLINICAL RESULTS

The primary purpose of our physiological studies was to ascertain whether any deviation from normal occurred in the metabolism of psoriasis patients. We have seen that a disturbance of the nitrogen metabolism does exist in psoriasis, more particularly in severe cases. We have demonstrated that such patients quite constantly retain nitrogen and that this element is needed for the proliferation of the epithelial cells of the skin. Indeed, without a bountiful supply of protein from the blood and tissue juices, such rapid cellular growth as occurs in psoriasis would be impossible.

We felt, therefore, that an eminently important as well as a practical aspect of our studies was to note the effect on the psoriasis eruption of diets containing different amounts of nitrogen. Such observations require adequate time for each experiment, as a dietary regime continued for only a short period might readily lead to confusion of interpretation. From our observations, *we are strongly inclined to believe that a high or even relatively high*

nitrogen diet has a baneful influence on psoriasis. In four of our patients (Cases 3, 4, 5, and 7), in whom this experiment was tried, an aggravation of the eruption occurred. With the exception of one patient (Case 7), it was impossible to continue the high nitrogen diet for a prolonged period, owing to the fact that we could not interne our patients in the hospital for a sufficient period of time, and, moreover, because of the prejudices of the patients who feared the influence of such a diet. In Case 3 a rapid extension of the psoriasis occurred in the early days of her hospital sojourn, while she was taking a relatively high amount of nitrogen. Many weeks later, after marked improvement had taken place, so that but insignificant vestiges of the disease remained, a high nitrogen diet was resumed for several weeks without apparent harm. At this time, however, the patient was eliminating nitrogen better than at any period of our observation. Whether one can stimulate the outbreak of psoriasis in a psoriatic patient free of the eruption we have not had the opportunity of determining. We shall continue our observations on the influence of a high nitrogen diet upon psoriasis patients in order to settle this question.

We were in a better position to determine the influence of a low nitrogen diet upon the activity of the psoriatic process, because of the fuller coöperation of our patients. Although this diet meant a greater deprivation of articles of food to which they were accustomed, still they preferred this regime, as in their own opinion it was conducive to their improvement. *We feel that there can exist little doubt as to the favorable influence of a low nitrogen diet on the eruption of psoriasis.* This is more strikingly seen in severe cases; for in such patients improvement is more rapidly and readily evident. In support of our conclusion, we place in evidence the photographic records of Cases 3, 5, 6, and 8, in whom the improvement was striking if, indeed, not remarkable. It would appear that the milder the case, *i. e.*, the more limited the eruption, the less pronounced and the less immediate is the influence of a low nitrogen diet. Some of our mild cases exhibited only a moderate degree of improvement.

It is well known that psoriasis is a disease subject to variations, both improvement and exacerbation, without known cause. The question might pertinently be asked whether the improvement could not have been mere coincidence, or, whether other factors could not have been responsible for the improvement observed. We have many times asked ourselves this question. It would be difficult to account for our results on the basis of pure coincidence. The sequence of events was too direct and the number of striking improvements reached too high a proportion to admit of such an explanation. Furthermore, all must concede that the changes for better or worse in psoriasis are not in reality spontaneous merely because they occur without apparent cause.

After carefully studying our patients and thoroughly scrutinizing all of the environmental conditions, we have been forced to eliminate the latter as influencing factors. It will be recalled that Case 7 was studied as a control in order to determine whether freedom from physical labor and from mental harassment, in a quiet, private room in a hospital, could have accounted for the improvement in some of the other patients. But this patient (who was placed on a high nitrogen diet) was, after eighty-four days' residence in the hospital, worse than upon admission. It is interesting here to note that this patient made decided improvement with respect to the nervous disorder (chorea) from which he was suffering, at the same time that his psoriasis was growing gradually worse. This observation does not lend any support to the theory of the neuropathic origin of the disease, which is held by a number of writers. On the other hand, Patient No. 3 was frequently in a highly nervous and apprehensive state, with numerous crying spells and periods of depression, and yet her eruption improved to the point of virtual disappearance.

In Figs. 13 and 14 are contrasted the eruptions in the case of a young man who was treated in the dispensary. He received no internal or external treatment of any kind whatsoever, but was placed upon a low nitrogen diet, which he faithfully carried out. The eruption entirely disappeared in two months, leaving pigmented spots which subsequently faded away. The second photograph was taken in the month of May.

The enormous proliferation of the epithelial cells of the rete mucosum in psoriasis and their exfoliation from the skin after they have been cornified, creates a great demand for protein. This protein can only be supplied through the blood and lymph streams. The diverting of the food protein to this purpose natu-

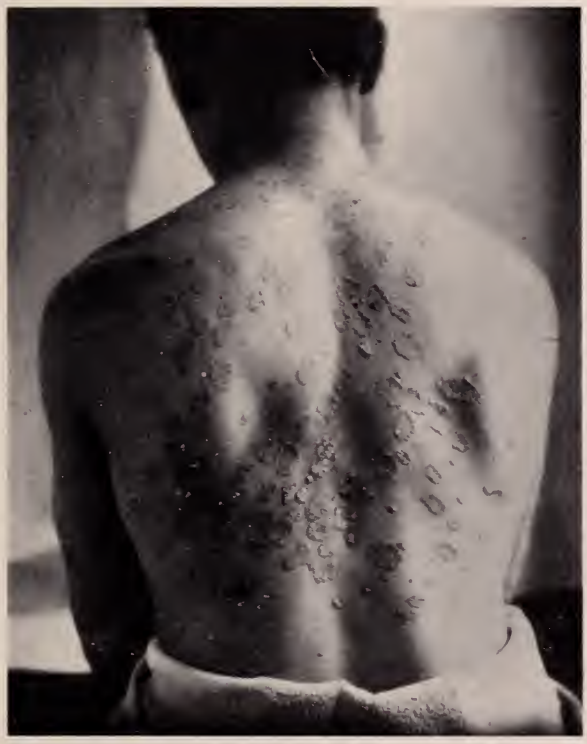

FIG. 13.—Dispensary patient. (Courtesy of Jour. Cutan. Dis., November, 1913.)

rally lessens the amount catabolized in the system and eliminated in the excreta. Nitrogen retention may in considerable part be explained by the loss of protein through scaling. But this does not explain the entire retention because (1) the deficit of nitrogen in the excreta is greater than can be accounted for by the amount lost through the skin; and (2) we have, in a most thoroughly

studied case, observed a considerable retention of nitrogen after the scaling had ceased and the eruption had virtually disappeared.

This retention is difficult to account for. It is possible that the skin, during its great proliferative activity, may call upon the

FIG. 14.—Dispensary patient. Disappearance of eruption in two months on low protein diet. No internal or external treatment whatsoever. (Courtesy of Jour. Cutan. Dis., November, 1913.)

mobilizable protein in the muscles and other tissues and that, later, this reserve protein may be restored from the food protein ingested.

A nitrogen retention having been established to exist in psoriasis, the question presents itself, Is the nitrogen retention primary and to be regarded as the etiological factor or one of the etiological factors in the causation of the disease, or is it secondary to the pathological changes in the skin? This question cannot be definitely settled at this stage of our investigations, although the latter proposition appears to be more in harmony with the demonstrated facts.

In the present stage of our research studies we are unable to set up any hypothesis as to the cause of the disease without departing from the domain of fact and entering the realm of conjecture. We are content to present our laboratory findings and set forth the results of our clinical observations. We are still in the midst of our pathological and metabolic studies and many problems must be solved before any definite pronouncement as to the nature and cause of psoriasis can be safely made.

SUMMARY AND CONCLUSIONS

A careful study was made of the protein metabolism of eight psoriasis patients and the following observations were made:

1. That on a given protein diet a psoriatic subject eliminates less nitrogen in the urine than does a normal individual on a corresponding diet. The urinary nitrogen in some of our patients reached a level lower than has ever been recorded.

2. Patients suffering from psoriasis exhibit a remarkable retention of nitrogen. This retention appears to be proportional, in a general way, to the extent and severity of the eruption present.

3. The nitrogen is retained to a greater degree than has been observed in connection with any other condition and is, furthermore, retained with great ease even on a diet low in nitrogen and insufficient in caloric value, and one on which a normal individual would fail to maintain equilibrium.

4. Experiments with urea feedings show conclusively that the nitrogen retention cannot be attributed to any disturbance in the eliminative capacity of the kidneys.

5. Patients with extensive psoriasis may lose very large amounts of nitrogen in the exfoliated scales, which consist of almost pure protein.

6. The retention of nitrogen in most of our cases was greater than could be accounted for by the protein lost in the scales, and it may persist even after scaling has ceased and the eruption has virtually disappeared.

7. A low nitrogen diet has a most favorable influence upon the eruption of psoriasis, particularly when the latter is extensive. Making all reservation suggested by scientific caution, we feel that there can be no doubt that severe cases of psoriasis improve under such a diet, almost to the point of disappearance of the eruption.

8. Conversely, a high nitrogen diet exhibits an unfavorable influence on psoriasis, commonly causing an extension of the eruption.

9. Whether a high nitrogen diet can stimulate an outbreak of psoriasis in a psoriatic subject, who is at the time free of the eruption, has not yet been determined.

10. The great proliferation and exfoliation of cells by the skin in psoriasis demand a large supply of protein, which can only be procured from the lymph and blood streams. This protein supply may be derived from the ingested food, and a possibility exists that the great demand of the diseased skin for protein may also be satisfied by the protein reserve in muscle tissue, which thus may become depleted and later require restoration. This would explain the ready and persistent retention of nitrogen in our cases.

11. A protracted, low protein diet may diminish the proliferative activity of the skin by diminishing the supply of the principal building material, namely, protein. On the other hand, a high protein diet may stimulate the proliferative activity of the cells by furnishing an abundant supply of the necessary protein.

12. We deem it premature at the present stage of our studies to commit ourselves to an hypothesis as to the primary cause of psoriasis. Our studies are being continued and extended in various directions.

DISCUSSION

Dr. A. I. Ringer (explaining chart): Both sheets show the same amount of nitrogen. From experiments it is found that a great amount of nitrogen is eliminated by the scales of the skin. Experiments have been formed to ascertain under what conditions psoriasis individuals retain nitrogen. A psoriasis individual will retain nitrogen even under conditions by which the normal person will lose it. The question is, Why does the psoriasis patient retain nitrogen? We try to explain this by the fact that the psoriasis individual throughout the entire course of the disease eliminates tremendous quantities of nitrogen by the scales. If the patient keeps himself on a certain degree of nitrogen there comes a time when this rapid growth of cells calls upon the storehouse of the body and thus depletes the body of nitrogen material. We also have to explain in what way the low nitrogen affects the condition of psoriasis; also the high. The cells proliferate and pushing to the surface become atrophied. By keeping down the nitrogen supply we bring about a so-called starvation of the epithelial cells.

Dr. John A. Kolmer: In approaching the study of psoriasis from the bacteriological stand-point, we considered three possibilities as outlined by Dr. Schamberg: (1) Psoriasis might be due to the implantation upon the skin of an exogenous parasite, as is observed in ringworm, favus, and tinea versicolor. (2) The disease might be caused by one of the common facultative organisms belonging to the group of cocci, so readily cultivable from the skin, in individuals in whom the soil is rendered favorable by special conditions. (3) The disease might be the result of the circulation in the fluids of the body and deposition in the skin of a microparasite, analogous to what is observed in syphilis and variola.

The scales and dry abscesses claimed our attention early in the research. Sixteen different organisms were isolated in 57 cultures from 24 cases of psoriasis. No organism was found which could be regarded as bearing an etiological relationship to the disease. An unidentified diplococcus "*x*" was found in 5 psoriatic lesions and in 1 blood culture, and is deserving of further study.

Investigations with the ultramicroscope of the serum from lesions of a large number of patients suffering with psoriasis and various other skin diseases, discovered the presence of a motile bacillary body in 17 out of 19 cases of psoriasis. In 18 other dermatoses they were found in 3 instances. These bodies are being further studied.

Anaërobic cultures of lesions in special culture media and the use of various special aërobic culture mediæ, composed of the scales, secretions,

and blood serum of psoriasis patients, did not show the presence of any special parasite.

Early in the research moist chamber cultivations of scales were employed, and a diplococcus was found with such constancy that we thought it might bear an etiological relationship to psoriasis. Cultures upon artificial media showed this diplococcus to belong to the group of diplococci found upon the skin. These moist chamber cultivations did not show any unusual organism or fungus.

Two vaccines were prepared of a large number of different organisms isolated from psoriatic lesions, but treatment with these yielded indifferent and inconclusive results.

Complement fixation tests were applied with two main objects in view:

1. To apply the Wassermann reaction in order to ascertain the presence or absence of lipodophilic antibodies or "reagin," similar to the antibody in syphilis.

2. To study complement-fixation with the sera of psoriatic patients, using extracts of scales and organisms cultured from the lesions, with the view of shedding light on the question of parasitism.

Nine of 48 cases of psoriasis, 18.7 per cent., yielded positive Wassermann reactions, using an alcoholic extract of luetic liver as antigen. With antigens reënforced with cholesterin, over 28 per cent. of 22 cases reacted positively. In the majority of these the reactions were slight. From a clinical study of the patients whose serums were studied, the positive tests cannot all be attributed to syphilis, although this might be true of a few of them; on the other hand, some significance must be attached to them, which future research alone can reveal.

Using for antigens aqueous and alcoholic extracts of psoriasis scales and of a large number of cultures of organisms isolated from lesions, complement-fixation was not found to occur with 10 sera from active cases of psoriasis. These results would indicate that either the true antigen was not present in the extracts of scales and cultures used, or that the psoriasis antibody, if it exists, was not present in the sera in sufficient amount to inactivate complement with the extracts used in this study.

The successful inoculation of the lower animals with psoriasis would facilitate research to a marked degree, and above all, would afford conclusive evidence regarding the nature of the disease. Repeated inoculation on monkeys and rabbits, including the implantation of buttons of psoriatic skin, scales, serum, and defibrinated blood, were negative in one to six months after inoculation.

THE ELECTROCARDIOGRAPH AS A CLINICAL INSTRUMENT[1]

By JAMES E. TALLEY, M.D.

For the skilled cardiologist there is nothing new offered in this paper. For the practitioner, who has waited to see if the electrocardiograph would prove a useful clinical instrument, there may be desired information. Some five years of experimental and clinical work conducted by various investigators has afforded facts the consideration of which proves the usefulness of the instrument.

About 1856, Kölliker and Müller demonstrated that each contraction of the heart generated electric currents like any contracting muscle. These currents are minute, and it was only about 1900 that Einthoven, a Dutch physiologist, perfected a galvanometer sufficiently sensitive to record them accurately and quickly.

Briefly, the electrocardiograph consists of a delicately silvered quartz or glass string 0.002 to 0.003 mm. in thickness, suspended between the poles of the galvanometer by a carrier and attached by wires to the electrodes leading from the patient. Between the patient and the instrument is a switchboard with several keys whose function is to protect the string, compensate for skin current, bring in or throw out of circuit the body, calibrate the excursion of the string, select the proper lead, etc. The delicate string is magnified by a microscope and its shadow, vibrating with each heart beat, is projected by an arc light through

[1] Read November 5, 1913.

the microscope upon the slit of a camera containing a plate or a film moving at a fixed rate and at the will of the operator.

Let us briefly review the theory of the electrocardiograph and the electrocardiogram of the normal heart contraction that we may understand the abnormal curves.

Electrodes attached to the patient's extremities will lead off these currents to the galvanometer just as accurately as if the heart were exposed and the electrodes applied directly to that contracting viscus.

That these curves arise from the heart contractions is demonstrated by the fact that the curves obtained by the electrodes attached to the extremities, or attached to the intact chest walls immediately over auricle and ventricle, or attached to the auricle or ventricle laid bare, are all the same. Since the patient has only to lie or sit with his hands and a foot resting comfortably upon the electrodes covered with absorbent cotton and wet with a solution comfortably warm, every sufferer with cardiac disease is not only willing but anxious to lend himself for the study of his malady.

Thus on one hand we have the willing patient for direct examination, instead of drawing parallels between him and the experimental animal, and on the other hand an instrument so sensitive that every heart beat, no matter how rapid or irregular is recorded with mathematical precision. Certainly one of the few examples where a branch of medicine is reduced to an exact science.

We cannot as yet explain all the deflections in the electrocardiograms from a presumably normal heart. However, there are variations which are within the limits of health and still further variations which place the individual among the abnormal. It is the measurement of the direction, duration and time relationships of the events in these curves which forms the basis of electrocardiography. The curves given as normal are the result of the examination and a comparison of a series of curves from a group of healthy individuals. In a large group of presumably normal people, there is likely to be found an abnormal

curve or so, and a careful examination of the individual will reveal slight abnormalities of the heart never suspected before.

The curves for any given person are constant at all times, so much so, that they have been suggested as an added means of identification of the individual. Any marked deviation from one's particular curve, means a deviation in function. Given a normal curve we can predicate that the auricular contraction began at the pacemaker (sino-auricular node) and followed the usual course through the auricle, and, further, that the normal ventricular complex shows that this impulse reached the ventricles by way of the auriculoventricular bundle, its main branches and their ultimate subdivisions, for it has been demonstrated repeatedly, experimentally and clinically, that the character of an electrocardiogram like the curve from a contracting strip of plain muscle depends upon the point of origin and the direction of the current in the heart.

More often all graphic methods in heart disease are most useful in differentiating the arrhythmias, but the electrocardiograph also yields definite and often unexpected information derivable by no other means in some conditions where the rhythm is regular. For instance, there are certain deviations in the directions of parts of the curve representing each beat, where the rhythm is perfectly regular, that clinical experience has shown to be of bad prognostic significance.

Mitral and pulmonary stenosis are cardiac abnormalities which produce clear symptoms and physicial signs.

They should be, and postmortem shows that they are, accompanied by the expected right-sided ventricular hypertrophy. Such cases yield characteristic but abnormal curves. That such curves are characteristic of right-sided ventricular hypertrophy is also rendered likely from the following fact: Relative preponderance of the right ventricle is normal in the infant for the first few weeks after birth. Curves of such infants show the same characteristics referred to and keep them until the second or third month, when the child assumes the normal adult form.

The curves of left ventricle hypertrophy show deflections in

exactly the opposite directions to those of the right side. We should expect to find these characteristic curves of left ventricular hypertrophy in aortic valve disease, nephritis, arterial sclerosis, and any disease with a constant high blood-pressure. As a rule we do, but they are by no means as constant where expected as are the characteristic curves on the right side.

These abnormal curves on the left side are often absent where expected and appear when not expected. Many electrocardiographic findings and clinical comparisons serve to emphasize the facts that the physical signs which aim to differentiate right- and left-sided ventricular hypertrophy are not always reliable, that increased fluid pressure within the ventricle from an incompetent valve is far from explaining all cases of hypertrophy, and that on postmortem the distribution of increased muscle tissue is not always where expected.

There are evidently factors in hypertrophy which are as yet little understood, but there seems no valid objection to adopting the suggestion of Lewis to speak of right- and left-sided preponderance where these characteristic curves occur. Furthermore, these curves, when sufficient electrocardiographic and postmortem material from the same cases are collected, may help throw more light upon the subject.

We cannot repeat too often that a normal electrocardiogram means that the impulse arose in a supraventricular focus, and followed the normal pathway, the auriculoventricular bundle, throughout all its ramifications, to and throughout the ventricles.

Again, the electrocardiograph alone reveals contractions which arise in a supraventricular focus but follow an abnormal course to the ventricle, the so-called *aberrant* contractions.

For instance, if the *left* main branch of the auriculoventricular bundle is permanently or transiently deficient, the impulse is entirely deflected to the *right* side of the heart and though eventually both ventricles contract, the curves of such contractions are abnormal. They partake partly of the nature of the curves of right-sided preponderance or of stimulation near the base of the right ventricle.

If the *right* main division of the auriculoventricular bundle is deficient, the impulse is carried to the *left* ventricle and the curves simulate the curves of left-sided preponderance and apical stimulation. Though these curves of aberrant contractions simulate the curves of preponderance, the two are fairly easily distinguishable by exact measurement. The only physical signs in a patient with aberrant contractions may be the presence of reduplicated first sound and some enlargement of the heart on percussion.

The electrocardiograph alone reveals these defects of the main divisions of the bundle. Where this condition is permanent a main stem of the bundle is probably involved in a fibrotic change surrounding it. It is frequently associated with auriculoventricular heart block. Right bundle defect is the commonest, and it is most frequently associated with aortic disease.

It may be found that there is an anatomical reason, the aortic valve and ring thickening may cut off the blood supply more often to the right ventricle. This condition is of bad prognostic significance. Where temporary it suggests acute involvement of the bundle branch by toxins and bacertia. Lewis has recorded rheumatic cases where the condition cleared up as the fever subsided. Here we have definite evidence of myocardial involvement and an explanation of slight fever explained in some cases by no other means. A galvanometric examination of the function of the cardiac muscle in rheumatic and other febrile diseases would probably often show that we frequently put patients to bed too late and allow them around too early.

A comparison of our knowledge of the cardiac arrhythmias a decade ago with the wealth of known facts today is a glowing tribute to the polygraph, the electrocardiograph, and the workers with these instruments.

Irregularity of the heart's action has been shown to be a complex subject, and yet capable of being resolved into several more or less simple varieties by these instruments of precision. Moreover, the fixing of these definite clinical entities has added much to our prognostic and therapeutic knowledge of heart disease.

The cardiac irregularities are included under the following heads: auriculoventricular block, extrasystoles or premature beats, simple paroxysmal tachycardia, auricular flutter, auricular fibrillation, sinus disturbances, and alternation.

The electrocardiograph depicts with mathematical accuracy any variation in the conducting function of the auriculoventricular bundle. We know that normally the impulses causing the cardiac contractions arise in the sino-auricular node (at the junction of the superior vena cava and auricle) and travel by the auriculoventricular bundle to the ventricles in at least 0.2 second. Any increase beyond 0.2 second, in this technically named a–c or P–R interval, is abnormal and detected with the greatest accuracy by the electrocardiograph. Frequently this increased P–R interval, the first step in block, is the only evidence we have that rheumatism or other infective disease has involved the myocardium. With precision the instrument pictures simple prolonged conduction, dropped beats, the varying responses of the ventricle to the auricle, complete dissociation of auricle and ventricle and finally the exact sites at which the impulses arise which control the independently beating auricle and ventricle. The same curves not infrequently show not only heart block but right- or left-sided hypertrophy, and premature beats with the exact location of the origin. Furthermore, the slow pulse due to true bradycardia, such as occurs after infectious diseases like influenza, and true nodal rhythm are sharply defined from block.

Premature beats, the commonest cause of intermittent pulse, are shown to be ectopic in their origin, that is, they arise at points other than the sino-auricular node. Their ventricular, auricular, or junctional origin is made clear. If ventricular the shape of the curve shows whether they arise in right or left ventricle. If auricular their abnormal curve reveals their ectopic focus of origin, their abnormal course through the auricle, and, further, the normal ventricular response shows that the impulse followed the normal path (auriculoventricular bundle) to and throughout the ventricles. Again, if the ventricular response is

abnormal to this ectopic stimulation from the auricle it is shown to be due to deficient conduction in one of the main divisions of the bundle (aberration). Premature beats are easily recognized in electrocardiograms, but in other graphic records, especially where they occur in groups, they may stimulate auricular fibrillation, heart block, flutter, and alternation.

Simple acceleration of the pulse such as occurs in fever, hyperthyroidism, after muscular exercise and emotion are distinguished by their normal electrocardiographic curves from simple paroxysmal tachycardia. The latter is due to an ectopic focus in the auricle catching the lead and dominating the rhythm. This focus is usually in the auricle but occasionally in the ventricle. The electrocardiograms distinguish simple acceleration, simple paroxysmal tachycardia, and auricular flutter.

Auricular flutter, unless treated by digitalis and a higher grade of heart block than the usual 2 to 1 produced, can rarely be diagnosed accurately except by the electrocardiograph, and that instrument alone reveals the ectopic origin of this abnormal form of heart action. Untreated this rapid heart action tends to persist over long periods much to the detriment of the patient with an already overtaxed heart. The good results of treatment are fully worth the trouble of an accurate diagnosis.

Auricular fibrillation demands accurate diagnosis because of its frequency and the usual brilliant results in treatment. True it can be diagnosed often by the palpating finger, the stethoscope or the polygraph, but slow fibrillation is easily overlooked if ordinary methods alone are used in diagnosis. The constant absence of auricular contraction variation P, and the presence of the oscillations due to the fibrillating auricle in the curves, the perfectly regular pulse with the auricle still fibrillating where complete block is present, the pictures of block, of aberrant ventricular responses, of ventricular extrasystoles with their different foci or origin, as in digitalis coupling, make the curves quite worth while, though the bare diagnosis of auricular fibrillation may be already made by other means. Respiratory arrhythmias and sino-auricular block are worthy of distinct separation from

other irregularities, not because of their clinical importance, but to allay the anxiety of the patient, and not infrequently of the physician himself.

In alternation we have perhaps the one condition where the polygraph may give evidence not afforded by the electrocardiograph. However, on the other hand the latter instrument sometimes shows alternation where the former fails. Recent evidence as to the grave prognostic significance of alternation make it worthy of study.

The introduction of the phonocardiograph by which murmurs may be registered graphically simultaneously with the electrocardiogram should prove useful, especially in teaching the subject of heart disease. This will be more practical since a form of electrocardiograph is appearing in which two strings may be used in the same galvanometer, one registering the heart contraction (electrocardiogram) the other the heart sounds and valvular murmurs (phonocardiogram).

In the electrocardiograph we have then an instrument which shows whether each impulse that gives rise to a cardiac contraction arises in the normal pacemaker (sino-auricular node) or elsewhere in the auricle or in the ventricle, whether the impulse pursues the normal course through the A–V bundle to and throughout the ventricles, or an aberrant course, and whether the rate of propagation from the auricle to the ventricle was normal or delayed. An instrument which pictures all these facts with mathematical precision must be and is more accurate than the registration of cardiac movements by means of the polygraph which depicts alone the changes in intra-auricular, intraventricular, and intravascular pressure. However, though the electrocardiograph will be the court of last resort the ink polygraph, because of its portability, its comparatively small cost, and the large amount of information it is capable of providing is in no danger of being relegated to the shelf. Again, the knowledge obtained from electrocardiograms makes easier today the interpretation of polygraph curves with greater accuracy, and a knowledge of the information afforded by both instruments

increases the diagnostic ability of the physician by means of the palpating finger and the stethoscope alone. The different forms of cardiac irregularity have been shown to vary widely in their prognostic significance and their reaction to treatment. In the future the patient will expect, the insurance companies will often require, and the conscientious physician will not rest satisfied without a determination of the exact character of the cardiac irregularity in question.

The increased working reliability of a good electrocardiograph today, the decreased price, and the known refinements in diagnosis it affords render the possession of one necessary by every hospital trying to do the best grade of work in cardiac diseases. Since the best deflections of the string are obtained in a strong magnetic field, the electrocardiograph with a *permanent magnet* now on the market must prove its worth before its greatly reduced price should be a factor in selecting an instrument.

The writer has attempted to treat the subject in a general way. Those not already familiar with it will find the whole subject technically yet simply set forth in the small book on Clinical Electrocardiography by Dr. Thomas Lewis, to whom the writer wishes to express keen appreciation of his work and of the opportunities to participate therein in his laboratory by those interested in the subject.

CONGENITAL HIGH SCAPULA (SPRENGEL'S DISEASE)[1]

By JOSEPH SAILER, M.D.

In 1888 McBurney and Sands reported two cases of a curious deformity to which attention had not previously been attracted. McBurney's patient was a woman, aged twenty-eight years, the angle of whose right scapula pointed directly toward the spine. The superior angle was therefore high above the centre of the clavicle. The right clavicle was one and one-half inches longer than the left, but the sternal and acromial processes were apparently normal. The arm could not be raised above the shoulder. Sands' patient was a child. He described an operation for the correction of this deformity which consisted of a division of the trapezius and the resection of the left angle of the scapula. As there was no benefit, the curved upper edge of the scapula was resected and improvement was reported. Whether this was merely in appearance or involved an increase of functional activity it is difficult to say. Three years later Sprengel reported 4 cases of this condition. He was entirely unaware of the reports of McBurney and Sands, and this renders his statement that the condition had not previously been reported in literature open to the suspicion of inaccuracy. His patients were all children, aged from one to seven and one-half years. In all the left shoulder was affected. There was no disturbance of function excepting inability to elevate the arm. His paper was something more than a mere case report because he endeavored to discover how the deformity occurred. He thought it might be due to the intra-uterine position of the arm so that the forearm was against the back and the back of the hand against the

[1] Read December 3, 1913.

sacrum. This would throw the shoulder up during fetal life and might give rise ultimately to the deformity.

Cases were subsequently reported by other physicians. Among others Kölliker in 1895 reported 2 cases, one on the right and the other on the left side, both associated with exostoses on the scapula. He called attention to the resemblance between this condition and the epiphyseal exostoses of the long bones. He was unable to note any functional disturbance. Joachimsthal, in 1900, was able to report 3 cases and he collected no less than 18 references to the literature, representing in all 36 cases, including his own. Thirty-four of these cases were unilateral and two were bilateral. He is rather inclined to accept Sprengel's explanation, particularly because he has observed that these patients, as a rule, prefer to hold the arm against the back. He notes that there are three anomalies in the position of the scapula: (1) It is higher on the affected side than on the other; (2) it is placed obliquely with the lower angle approximating the vertebral column; (3) it bends forward as if rotating on a horizontal axis, so that the lower angle is somewhat separated from the thorax and the upper angle bends forward upon the clavicle as if it were a hook-like exostosis. All these deformities clearly show in the case that I present this evening. Kermisson has called particular attention to the fact that in practically all these cases the shoulder-blade is extensively deformed and he believes that this error in the development of the shoulder-blade is the essential feature in producing the anomaly. Others have supposed it was due to defect in development of the muscles, but whether the muscular anomalies are primary or secondary is a question that probably cannot be answered. Dr. Ashhurst, two years ago reported before the Academy of Surgery of the College, a case of this nature with a description of a satisfactory operation for the reduction of the deformity. This operation consisted essentially of separating certain muscles from the bone and their attachment at other points.

But little need be said about this patient. He was a particularly sturdy farmer, aged twenty-three years, admitted to my service

at the Philadelphia, Hospital complaining of a mild bronchitis from which he readily recovered. He submitted willingly enough to examination, photography (Figs. 1, 2, and 3), and röntgenography, returned to his home and continued with his work. It did not appear that the left arm was weaker than the right in any way,

Fig. 1

but it was impossible for him to adduct it from the side above the the horizontal line. Backward motion was fairly good and forward motion unimpaired. The interesting feature of this case is the peculiar behavior of the inner edge of the scapula. It will be seen that this bone occupies both the high and oblique

position described by Joachimsthal. The lower angle of the scapula is not, however, directed toward the spine, but almost downward, and there is an additional anomalous angle, if one may so describe it, that is produced by the angulation of the inner edge (Fig. 4). This inner edge approximates the spinal column

Fig. 2

and forms with it a very distinct joint, and the movement of this joint could be felt beneath the skin. Apparently the formation of this joint is very unusual in these cases; at least in an incomplete examination of the literature I have been able to find no reference to it. The forward tilt of the scapula is very plain. It is probably merely a coincident condition due to the fact

that, as it rides up the posterior surface of the thorax, it naturally bends forward. There is no evidence that the inferior angle was lifted from the thoracic wall as Joachimsthal has described. The chief manifestation of this position in the plates I present is the very small portion of the bone which shows above the spine.

Fig. 3

The elongation of the clavicle is well shown and the acromial process of the scapula extends quite a distance over the shoulder-joint, the hook-like superior angle, extending far above the level of the clavicle and producing the deformity that called our attention to this case, is very clearly shown.

To my mind, although the theory of Sprengel is alluring in its

simplicity, it does not seem to explain either the elongation of the clavicle in the present case nor would it explain the curious deformity of the inner edge and the joint with some portion of the spinal column. The latter may, indeed, be supposed to be merely an artificial joint produced by rubbing the two surfaces together; but I think of no form of malposition that would cause the inner edge to reach out toward the spinal column and rub against it.

FIG. 4.—Superior angle above the scapula. The false joint is seen on the right.

The title of this paper is misleading. Deformity would be a much better word than disease, and is often used, but the name of McBurney and Sands should unquestionably be substituted for that of Sprengel. Their report antedated his by three years, and although they did not attempt to explain the deformity, Sands, at least, was the first to attempt therapeutic measures, and nothing of real importance has been added to their description.

THE DIAGNOSIS AND TREATMENT OF LUMBO-SACRAL PELVIC PAIN[1]

By FREDERICK P. HENRY, M.D.

I ACCEPTED the invitation to take part in this symposium rather impulsively. When I received it I was suffering from a sharp attack of lumbago, and it seemed to me that, so far as the diagnosis and symptomatology of that particular form of lumbar sacral pain were concerned, I had nothing to learn and a great deal to say. After my letter of acceptance had been dispatched I noticed, what had previously escaped my attention, that the treatment of the various forms of lumbar sacral pelvic pain were to be discussed and began to reflect upon the inefficacy of treatment in my own case. I then regretted that I had been so impulsive.

The commonest form of lumbar pain is undoubtedly lumbago. Very few escape it. Some have had it in their youth and outlived it or think they have; some have outlived their youth and have not yet suffered from it, but they are a negligible quantity, and even they are not immune. In most cases the patient, if he is well advanced in years, will tell you that he has suffered from it at intervals of months, or even years, in early manhood, in middle life, and in old age. It is not, in my experience, a disease of adolescence. I have had such a personal interest in lumbago that I have looked up the word in the lexicon. It is not a classical word. It was first employed by a certain Sextus Pompeius Festus, a grammarian, who wrote in the early part of the eighth century, A.D. The fact that the first person who used the word was a

[1] Read December 3, 1913.

grammarian suggests the idea that he suffered from the affection himself and coined the word which, ever since his time, has been applied to it. He defines lumbago as a "vitium e debilitas lumborum." The word vitium, literally vice, naturally suggests the idea of syphilis, but there is no causal association between lumbago and syphilis. I do not mean to imply that they are mutually exclusive but, in my experience, the syphilitic are no more liable to lumbago that the non-syphilitic. The sufferer from lumbago has sometimes almost wished that the affection were syphilitic, for in that case he would have specific remedies at his command.

The diagnosis of lumbago is, in most cases, a very simple matter. Its sudden onset in the midst of health, usually after some trivial exertion, such as lifting a child from the ground, putting up a dumb-bell, or even leaning over to tie one's shoestring, with the simultaneous conversion of a yielding and flexible, into a rigid and painful spine; these symptoms, together with the seat of the pain in the lumbosacral region are usually all sufficient. Tenderness on deep pressure over the sacro-iliac symphysis may usually be elicited, and it is sometimes limited to one side or, if bilateral, is greater on one side than the other. The general health is, usually, not in the least impaired. Now while the disease seems generally to be caused by some kind of muscular exertion it will be found on careful inquiry, or equally careful introspection, that there were some slight premonitions of the attack beforehand. In other words, the disease was already present when the movement called into play the muscles and tendinous structures involved in it. Or one might almost suppose that the disease was present but unperceived until the muscular movement had, in some unknown way, opened up paths of sensory conduction which had been previously blocked.

I have said that the diagnosis of lumbago is easy, but I have known it to be confounded with abdominal aneurysm. I was once *particeps criminis* in such a diagnostic blunder. At the time, it was in the seventies, I was one of Dr. Strawbridge's assistants at his eye infirmary. The patient was a young man with syphilitic retinitis. I can recall him to mind most distinctly; I even

remember his name. His eye-ground presented such a beautiful picture that we encouraged him to come almost daily to the infirmary and we gazed at his retina while he complained bitterly of his backache. We attributed it to syphilis, and were right in so doing. One Sunday morning Dr. Strawbridge received word that this patient, in whom he took a great interest, had suddenly died, and he summoned me and his other assistant, Dr. Nancrède, to go with him to the man's house to make an autopsy. It did not take us long to find the cause of the lumbago. The abdominal cavity was filled with clots from a huge ruptured aneurysm which had deeply eroded the bodies of two or three of the lower lumbar vertebræ. I have never made the same mistake again, but I came very near it a few years ago at the Philadelphia Hospital. I was going through the ward with my resident who had just completed his term of service in the neurological department and knew the name of every reflex, tendinous or cutaneous, and seemed especially interested in the subject of spasticity. He called my attention to a patient who was seated in the chair at the foot of his bed in a doubled-up attitude and told me that he ought to be transferred to one of the so-called nervous wards. On asking his reasons for this opinion I was told that the man had all sorts of exaggerated reflexes and a well-marked spastic paralysis. The backache, which was the man's chief complaint, seemed to be a minor consideration. I did not examine the patient but consented to my resident's request that one of the chiefs of the neurological department should be consulted. This chanced to be Dr. Burr, who found the patient in bed and, on turning down the bed clothes to examine him, detected an abdominal aneurysm as big as a foot-ball. I never saw anyone more mortified than my resident, who was kind enough to acquit me of all responsibility in this case of mistaken diagnosis, on the ground that I had never examined the patient. Shortly afterward the aneurysm, ruptured, and the cause of the spastic paralysis and of the lumbago was plainly manifest. The lumbar vertebræ were eroded to such an extent as to lay bare the anterolateral columns of the cord.

Obstinate "lumbago" in the female should invariably lead to a uterine examination. I recall the case of a woman, aged fifty years, who suffered for more than a year with severe "lumbago." She also had rheumatoid arthritis, which association had misled others into the belief that the "lumbago" was rheumatic. On uterine examination I found the cervix occluded by a fibroid polypus almost as large as a walnut. It was removed with immediate and permanent relief of the lumbago. The case is reported in detail in Trans. Path. Soc., Phila., vol. viii.

The so-called typhoid spine, to which attention was first called by Gibney, of New York, is an affection of which I have had little experience, and that fact is sufficient to make me doubt its connection with typhoid fever. I say so because I have been in continuous service in large hospitals in this city since 1874, when I was elected visiting physician to the Episcopal Hospital, and during this period of about forty years have, as a matter of course, treated many hundreds of cases of typhoid fever. It seems to me, therefore, that if there existed any regular association between spondylitis, or any other affection of the spine, and typhoid fever, it would not have escaped my attention.

The *spondylose rhizomélique* of Marie is neither more nor less than osteo-arthritis of the intervertebral articulations, but its symptoms are so definite and so peculiar as to justify its separate place in nosology. Leaving lumbar pain out of the question, although that is the only symptom which warrants me in referring to the disease, it is recognized when well advanced by spinal rigidity, cervical kyphosis, and the regular involvement of the shoulder- and hip-joints.

There is one variety of lumbar pain of which the diagnosis is of the utmost importance. I refer to the pain, which may be intense, that is dependent upon metastatic carcinoma of the vertebræ. When the primary seat of carcinoma is the breast the metastasis referred to may occur, and the question of operation under such circumstances is one which, I believe, would be decided by most surgeons in the negative. The diagnosis of this condition, *i. e.*, the decision whether metastasis has, or has not, occurred, can

only be the result of the most careful investigation of the sensation and motion and reflexes of the parts innervated by the painful spinal area. I recently had under my care a patient, seen also by Drs. Gibbon and Spiller, whose case illustrated the vital importance of this differential diagnosis.

To return to the subject of lumbago: This word, like indigestion and jaundice, and every other symptomatic term, is liable to abuse. In speaking of indigestion I once remarked (see Preface of the seventh edition of *Flint's Practice of Medicine*) that it is a "serviceable cloak for ignorance but has been worn threadbare and is about to be discarded." The same is not altogether true of lumbago. It is undoubtedly a serviceable cloak for ignorance but it is not likely to be discarded because it is the name of a genuine disease for which, as yet, we have none that is better. So far as I know, Gowers has done more to elucidate the obscure subject of lumbago than anyone else (*British Med. Jour.*, January 16, 1904). There are some diseases which we look at as through a dark glass, while of others, which we now see face to face, it may be said that there was a time when we were actually looking away from them. Notable instances of these latter are malaria, yellow fever, infantile paralysis, and many others. Of lumbago it can be said that while we may not yet be seeing it face to face, we are, at least, not looking at it back to back, *i. e.*, away from it.

Gowers regards lumbago as an inflammation of the fibrous tissue of the muscles and not of the sensory nerve endings, basing this opinion chiefly upon the fact that the disease, beginning apparently in the substance of the muscles, extends to the tendinous structures. By such extension, sciatica, *i. e.*, inflammation of the sheath of the sciatic nerve, often arises. Gowers considers this extension of lumbago to the tendinous structures, and especially to the sheath of the sciatic nerve, as of fundamental importance in determining its nature; for if, says he, "a morbid process, by extension, presents itself as manifest inflammation, it must be originally inflammatory in nature." He acknowledges that the inflammation is of a peculiar type, inasmuch as it does not pro-

duce induration or suppuration and coins the word *fibrositis* to designate it.

The same process, fibrositis, which gives rise to lumbago is found, as a matter of course, in other muscles than those of the lumbosacral region. We are all familiar with it in the trapezius muscle but, according to Gowers, it reaches its maximun severity in the muscles of the arm. He gives a vivid description of this brachial myalgia or muscular fibrositis, as he prefers to call it, and speaks of it as a "terrible malady." The slightest attempt at motion, either active or passive, causes the most intense pain, and the joints of the shoulder, elbow, and wrist may be fixed as though by adhesions. When this affection is the result of an injury and involves the deltoid, fracture of the upper part of the humerus may be suspected. I have seen such cases before the days of the *x*-ray, when the patient had to be etherized in order to make a diagonsis. We are all familiar with a variety of sore throat in which, with no inflammation of the mucous membrane of the pharynx, there are pain and aching greatly exacerbated by deglutition. We call it rheumatic and treat it accordingly and often with brilliant success. It is due to the muscular fibrositis of Gowers, as are also pleurodynia and other varieties of myalgia. Nevertheless, we cannot take strict issue with those who apply to them the more popular term of neuritis, for they all tend to involve the nerve sheaths and, in some cases, eventually the tissues of the nerve itself, with consecutive muscular weakness and atrophy and disturbance, or loss of sensation. The fact appears to be that the distinction between the muscular fibrositis of Gowers, and muscular neuritis is largely hypothetical, a distinction with little difference. The sensory structures of muscle, the so-called "*muscle spindles*," convey the sensations characteristic of lumbago, but their anatomical structure is such as to cause them to be regarded as belonging to the fibrous tissue of muscle, "to that which sheaths and connects the muscular fibers, rather than to the latter." If, therefore, as Gowers maintains, lumbago is an affection of the interstitial muscular fibrous tissue, a muscular fibrositis, and the sensory nerve endings,

the "muscle spindles" are part and parcel of that tissue, it stands to reason that myalgia and muscular neuritis are inseparable.

I have consumed most of the time at my disposal, but I have wasted none of it in discussing the fallacy that lumbago is the result of dislocation of the sacro-iliac joint. I have no doubt that luxation or subluxation of this joint may occur and that it may be reduced by surgical manipulation. I have not, however, been speaking of a surgical affection. I have been discussing a variety of inflammation which is common to the muscles of the lumbosacral region and to those of the shoulder, the arm, the throat, the thorax, in a word, to the entire muscular system, and the fact of this general participation in the process is sufficient refutation of the fallacy to which I have alluded.

I will confine my remarks on treatment to the therapeutics of lumbago. The question whether lumbago is a manifestation of gout or articular rheumatism is an interesting one from the pathological standpoint but has little bearing on therapeutics for, in most cases, the salicyl compounds and their congeners, as well as colchicum, are of not much avail. Gowers holds that the anamnesis will reveal that the victims of lumbago, while they may never have had a well-defined attack of gout or rheumatism, are, in most cases, the descendants of gouty or rheumatic ancestors. They are suffering vicariously for the excesses of their progenitors, or, to employ the figure of the prophet Ezekiel: "the fathers have eaten sour grapes and the children's teeth are set on edge." Nevertheless, the salicyl compounds should be given a trial, especially at the beginning of the attack, and they will sometimes abort it. I have seen excellent results from a single large dose of quinia, meaning thereby from 10 to 20 grains, administered at the onset of the affection. The late Dr. Fagge taught that lumbago is generally due to a hyperacid state of the urine and there are many who still hold this opinion. The indication, from this therapeutic standpoint, is to make the urine alkaline as rapidly as possible with sodium or potassium bicarbonate, or potassium citrate, which seems to be the favorite drug for this purpose, employed by the English practitioners. Half-dram or dram

doses of Rochelle salts, are, I think, preferable. They may be administered every hour or two until the urine is alkaline and the bowels freely moved.

Lumbago affords one of the best examples of the importance of early treatment. The attempt to "walk it off," at its commencement, may succeed if the exercise is accompanied with free perspiration; but, in my experience, those who suffer from lumbago do not perspire readily. A turkish bath in the early stage is safer and more effective than exercise. When the affection is established, rest is imperative. Then also, local treatment consisting of dry cups, deep massage and the faradic current should be instituted, and if the salicyl compounds and their numerous succedaneae have failed, successful resort may be had to iodin. This drug I have found most efficient in its combination with a regular protein. I have had no experience with acupuncture, which is strongly recommended by Osler.

LUMBOSACRAL PAINS FROM AN ORTHOPEDIC STAND-POINT[1]

By GWILYM G. DAVIS, M.D.

The obscure pains involving the back, low-down, and the sacral region, were formerly usually ascribed to what was called Rheumatism, sometimes Lumbago, and also to some affections of the kidney and pelvic organs. It is only since Goldthwait and Osgood wrote their articles on the "Pelvic Articulations" in 1905 (*Boston Med. and Surg. Journal*, May 25 and June 1, 1905), that the subject has received orthopedic attention. They pointed out that the sacro-iliac joint possessed normally a slight amount of movement and claimed that it was affected by both disease and injuries which gave rise to certain definite symptoms, among which was included backache. They claimed that the joint became relaxed, strained, and even luxated. Since that time considerable has been written on the subject more or less in line with the views they expressed. There has, however, been a certain amount of scepticism in the minds of some orthopedic surgeons, well illustrated by the following statement by the veteran Dr. Ridlon of Chicago. He says (*Practical Medicine Series*, vol. xii, 1912; *Pediatrics and Orthopedic Surg.*, p. 231): "Since Goldthwait first discovered this (we fear imaginary) condition, we have been looking for relaxed, slipped, and displaced sacro-iliac joints. Every patient having pain or making any sort of complaint anywhere near the sacro-iliac region has been carefully examined and *x*-ray pictures have been made. We have travelled to Rochester, N. Y., and to Boston, Mass., and have been shown cases and told that they were slipped sacro-iliac joints, and we have

[1] Read December 3, 1912.

sat at the feet of the master, but we have not seen one case." In considering this question it is evident that there is a doubt in some minds as to whether the signs and symptoms described by Goldthwait and Osgood are due to a positive slipping of the sacro-iliac joint. While it is a desirable thing to be able to absolutely demonstrate the origin and cause of clinical phenomena it is not always possible to do so. Whether or not in this case we accept the explanation which is offered there seems to be no doubt that there occurs in certain cases symptoms which are referred to the region of the sacro-iliac joints. To what extent these symptoms are due to the involvement of the surrounding structures, such as the fibrous tissues and fascias and to the adjacent lumbar and lumbosacral and even hip-joints, is not always evident, and it is probably true that they are often confounded.

The mode of junction of the last lumbar vertebra with the sacrum is often so irregular that it is quite possible that many of the so-called sprains and pains experienced in this region, following unusual or extensive movements, can be accounted for by this fact. Sometimes the sacrum and vertebræ are fused together on one or both sides, at others the transverse process comes close to or touches the pelvis, making a distinct joint. An unusually close transverse process, by an unaccustomed lateral movement, such as occurs in tennis playing, etc., might be made to forcibly impinge on the adjacent ilium and give rise to what might be regarded as a lesion of the sacro-iliac joint and would be benefited by treatment for that affection. Personally I cannot accept *x*-ray photographs as being of any distinct value in determining the existence of sacro-iliac relaxation. It is of course of value in the osteo-arthritic affections in which bone alterations may be shown there as elsewhere. To my mind the existence of distinct lesions having their main seat in the sacro-iliac joints has practically been accepted as a fact. As to the frequency of such lesions there is a wide difference of opinion. According to my experience cases which give rise to such distinct evidences as to leave little room for doubt are rare. In one case I could not only feel

a grating movement when the hand was laid on the sacro-iliac joint and the limb moved but a decided clicking sound occurred which could be distinctly heard. The following case is illustrative: A man slipped from a chair and sustained a sprain of the lower part of the back which caused severe pain; for this he was under a physician's care for several days. This was sixteen years previous to my seeing him. Two years after his first accident he slipped while sitting down on a step. He again had pain in the same place and had to crawl on his hands and knees. Since then he has consulted nine physicians and was told that he had rheumatism, gout, lumbago, torn muscles, bone out of place, etc. He wears a wide binder bandage which gives him some comfort. He has numerous and severe attacks of pain. He complains of pain over the upper part of the right sacro-iliac joint and on making certain exercises he says he can feel and hear it click. A firm belt made by an instrument maker with a pad to make pressure over the sacrum, gave considerable relief. Since then his physician said he had done well. I believe this case to be one of lesion of the right sacro-iliac joint which was relieved by a proper supporting appliance. Most of the cases, however, come complaining of pain low down in the back or sacral region with no positive evidence of any looseness whatever of the sacro-iliac joint. The usual tests of flexing the hip with the knee in the extended position, flexing and extending the thighs, etc., are unsatisfactory and unconvincing. Nevertheless it has been found, for clinincal purposes, that when the complaint is localized in the region of the sacro-iliac joint it is wise to consider that part affected and direct measures accordingly. The pain may extend upward or across the sacrum or down the thighs. They are usually caused by standing in certain positions, long walking, unusual exercise, etc. The body may be inclined toward the opposite side. These pains may be at times extremely severe. Limping is not a marked symptom, but local tenderness can often be elicited.

Frequently, especially in men, a confined or cramped or unusual attitude assumed in their work indicated the possible source

of their trouble. Certain it is that troubles in this region, partaking of the nature of backache, situated low-down in the sacral and lumbosacral regions are common. As regards their cause, it can be often traced to traumatism in some form. We are not considering the loose pelvis associated with pregnancy. Occupation strain accounts for some of them. Many of them I am convinced have for their main basis an osteo-arthritic condition not only of one but both sacro-iliac joints and sometimes the lumbar spine. A history can often be obtained of pains in other joints and parts of the body and not infrequently of a previous distinct rheumatoid attack. People who are so disposed cannot endure any occupation necessitating the bent back for any length of time, or the lifting of heavy weights, etc. I also suspect a gouty condition in these cases. Gout assumes many atypical forms, and I believe it can affect the lumbosacral ligaments and fascias. I have excised fibrous gouty nodules—tophi—from the feet of a young man twenty-six years of age, hence the affection is not confined to the aged. What I may term a rheumatoid gouty arthritic diathesis is, I believe, exceedingly prevalent in the community, and one of its manifestations is sacral backache originating from traumatism, sometimes acute, or a more or less chronic strain. The discomfort occasioned by painful feet is also a contributory cause.

Viewing the affection from this stand-point the treatment should be both hygienic or constitutional and local.

These patients are apt to be constipated; at all events a course of saline laxatives is of service. Digestive disturbances should be corrected and sometimes aspirin or salol or a course of the iodides given. Rarely is massage indicated, it is usually better to proceed on the opposite plan of support and rest. If massage is used it should be light and superficial, it is of more service applied to the abdomen to relieve constipation and correct any tendency to ptosis. These patients are often neurasthenic to a high degree and more or less intractable.

Locally firm strapping with a belt of adhesive plaster frequently gives comfort. For men a belt of leather or canvas

may be ordered which passes around the pelvis between the crest of the ilium above and the greater trochanter below (Figs. 1

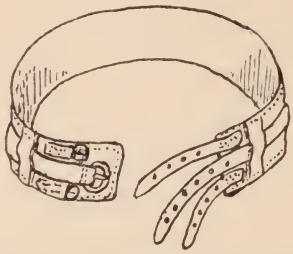

Fig. 1.—Strap belt. The middle strap goes entirely around the body, but the two shorter straps are attached to the ends of the canvas. This belt encircles the hips just above the trochanters.

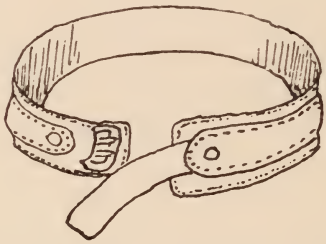

Fig. 2.—Canvas belt containing a strip of mild steel. This is bent to conform to the body and to make pressure posteriorly if desired.

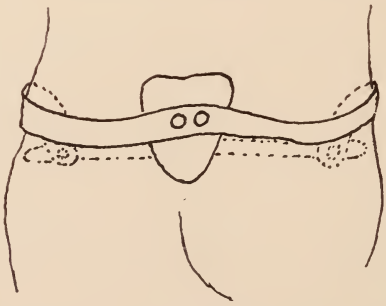

Fig. 3.—Sacral truss, made of steel; its two anterior ends are connected by a strap. Pad over the sacrum. It is used when it is desired to make pressure over the sacrum without making lateral pressure.

and 2). In women the lower part of the corset may be reinforced either by additional strips of steel sewed on or by bands of

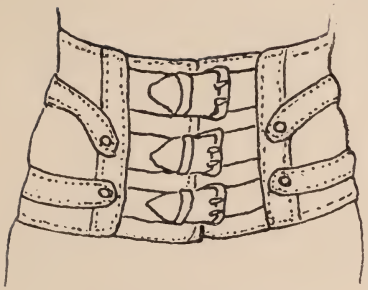

Fig. 4.—Anterior view.

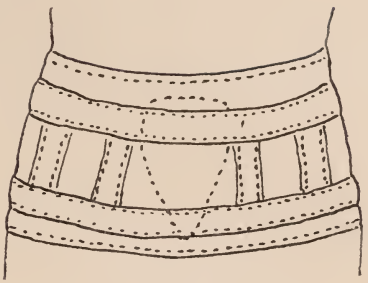

Fig. 5.—Posterior view.

FIGS. 4 and 5.—Anterior and posterior views of sacral belt composed of canvas strengthened by two strips of mild steel around the pelvis, joined by shorter strips passing up and down. The upper strip is above the crest of the ilium and the lower between it and the greater trochanter. This belt is made wide so that its upper end encircles the waist and obviates a tendency to work upward. A pad is used over the sacrum.

FIG. 6.—Corset strengthened by two upright steel strips and one around the pelvis. If desired, shoulder straps may be used: they will limit lateral movement. As a corset is only adjustable at the back the lower end of the strips are joined by two cross pieces which slide as the strings are tightened or loosened. They also give rigidity. Only one transverse strip is shown around the hips, but others may be added both longitudinally and transversely until the desired amount of stiffness is attained. A sacral pad may also be added if thought advisable.

webbing across the lower part (Fig. 6). The addition of shoulder straps will tend to eliminate the tendency to lateral movement as will also the leather back splint of Cook, worn underneath the

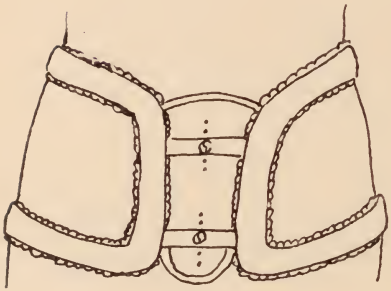

Fig. 7

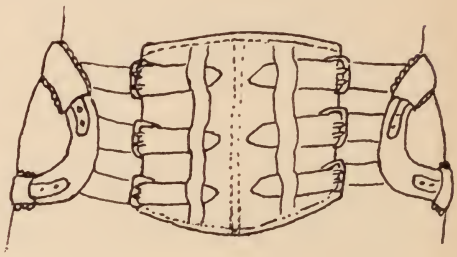

Fig. 8

FIGS. 7 and 8.—Posterior and anterior views of Dr. Merrill's brace for sacro-iliac relaxation.

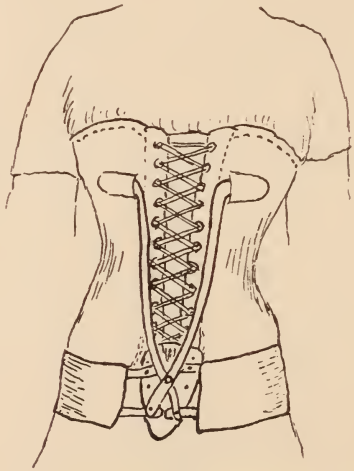

FIG. 9.—Dr. Osgood's brace for sacro-iliac relaxation.

corset. Where firmer support is desired an apparatus consisting of a wide canvas belt, strengthened with strips of steel at the back and bands around the body, both above and below the iliac crests and firmly buckled on, may be made by the instrument

maker (Figs. 4 and 5). By extending it upward it may be used to fix the lumbar spine or even higher still. If pressure is desired over the sacrum a pad may be inserted in the above belt, or an instrument made on the pattern and principle of a truss (Fig. 3), or the more elaborate apparatuses of Merrill (Figs. 7 and 8) or Osgood (Fig. 9) may be ordered. Rarely a plaster cast may be used. By these means most of these cases are made more comfortable and many of them will be practically cured. Viewed from an exact scientific stand-point the complaint cannot but be regarded as an unsatisfactory one, but viewed from the clinical side we are aided in recognizing and classifying the troubles and are provided with a line of treatment which is more rational than was heretofore at our disposal and that in many cases is followed by most gratifying results.

DIAGNOSIS AND TREATMENT OF LUMBOSACRAL PELVIC PAIN[1]

By E. E. MONTGOMERY, M.D., LL.D., F.A.C.S.

Pain in the back, lumbosacral pain, or sacralgia, in women has been regarded as an indication of some disorder of her genital organs. As a symptom it has been attributed to laceration of the cervix, cervical carcinoma, endocervicitis, endometritis, metritis, retrodisplacement and prolapsus uteri, fibroid tumors, salpingitis and oöphoritis. The universality of its association testifies to its want of significance as an important symptom. The pain due to disease of the pelvic organs is by no means limited to the sacral region, but is also felt in the lower portion of the abdomen, in the rectum and anus, and down the thighs.

The frequency of such pain in the opposite sex should make it evident that it has in many, if not in the majority of instances, other causes for its presence. My experience constrains me to believe that sacral pain, when it occurs in association with pelvic disease, is more frequently an expression of neurasthenia, which is doubtless promoted or aggravated by the pelvic lesions. This affords an explanation for the so frequent unsatisfactory results of operative procedures in gynecic conditions. When the patient has been informed that the pain in her back is due to a pelvic lesion, and she submits to an operation therefor, from which she gets up with the old time ache as severe as before, she naturally concludes that a mistake has been made, and the operation has been done unnecessarily.

[1] Read December 3, 1913.

Much importance is often given to the discomfort at the menstrual period as an indication of its genital origin, but it should not be overlooked that the hypertension associated with the advent of a menstrual period accentuates all existing inflammatory disturbances. Women with chronic inflammation of the appendix feel themselves threatened with acute appendicitis with every menstrual epoch, and the well-known appearance at or near the periods of migraine, epilepsy, mental disturbance, and other neurotic conditions, in persons predisposed thereto, are due likewise to the increased arterial tension.

The occurrence, then, of severe lumbosacral pain must be considered an indication for careful investigation, not only to determine responsible gynecic conditions, but also to exclude other possible causes. Disease of the bony structures forming the pelvis, of the articulations, of the muscular structures, and disease near to, or remote from nerve structures must be considered in arriving at a correct diagnosis, and in deciding as to appropriate measures for treatment. The recognition of disease of the pelvic bones, of alterations in the joints following injuries, of disease of the articulations, deformities, curvatures and rotations of the spine, partial or constant loss of power in certain muscles or group of muscles, evidence of myalgia in the back, are all conditions to be considered as absolute evidence of their being the cause of the symptom until other possible culpable conditions can be excluded.

Treatment. Exclusion of other causes, and the recognition of lesions of the genital organs should indicate that treatment be directed to their correction. Lacerations of the cervix, severe inflammations of the uterus, tubes, and ovaries are best corrected by surgical measures; retrodisplacements and prolapsus by mechanical or surgical measures; while fibroid tumor frequently, and carcinoma of the cervix when possible, call for extirpation of the uterus. The patient should not be led to expect that the pain or ache will be positively eliminated by treatment, whether medical or surgical, but be assured that her endurance will be increased and the symptoms be less constant.

LUMBOSACRAL PELVIC PAIN[1]

By CHARLES F. NASSAU, M.D., LL.D.

There are many reasons for pain in this region, and it is of prime importance to determine whether the disease is at the site of the pain or whether the pain is a referred one. If the tenderness elicited by the palpating hand is in the area of which the patient complains, we are probably not dealing with a referred pain; if, on the other hand, pressure does not produce pain in this area, we are at least justified in considering the possibility of a lesion elsewhere referred to this spot.

As we all know, there are several kinds of referred pain. There s that variety in which the irritation is at the nerve root or anywhere along the course of the nerve and the pain is in the terminal filaments. The classical example of this type is the knee pain in hip-joint disease. The obturator nerve passes over the hip-joint capsule, sending a few twigs into the joint, and then proceeds to the region of the knee. Inflammation in the hip irritates these twigs from the obturator, or thickening of the joint capsule presses upon the obturator itself and the message is sent to the knee. The abdominal pain of a pleuropneumonia is another well-known example. There is that variety of referred pain in which the pain is sent to and fro between communicating groups of nerves; for example, sacral pain from fissure or ulcer in ano; stomach-ache from carcinoma of the rectum. Occasionally, where there are two organs possessing the same function, as the kidneys or the ovaries, and one of these is diseased or abnormally located and the other healthy, the pain is referred to the healthy

[1] Read December 3, 1913.

organ. Estes has had two such cases, in each of which pain was referred from a wandering right kidney to a normal left kidney. Fixation of the right kidney promptly relieved the symptoms in the left one. Then there are the pains throughout the course of a nerve—radiating pains, such as those radiating from the umbilicus in appendicitis.

Lumbar pain often heralds the invasion of an acute infection, and it is well to note whether we are dealing with a local condition or whether the pain is but one sign of a constitutional disorder, the characteristic symptoms of which will develop later. If the patient has a fever of 100° F. or over, with backache, we must eliminate meningitis, acute rheumatism, streptococcic tonsillitis, or any other acute invasion. Acute nephritis is also to be considered.

Lumbar pain, however, may be the only symptom of which the patient complains. We then wish to know whether it is constant or intermittent; whether it came on suddenly or not; we ask him to locate it. Did it follow some extraordinary exertion or unpremeditated action? What is its duration? Has he ever had a pain like it before? If intermittent, what action, if any, will cause its return? When present what position seems to ease it?

We inspect the region and may see a patch of herpes which may be either the real cause of pain or merely an outward sign of cord or bone lesion; we look for swelling, redness, undue prominences or irregularities of the spine, bruises, purpura, or a pulsating tumor.

We palpate for spots of tenderness either in muscle or bone; to note fluctuation. We tap each spinal process to elicit pain; jar the heels with the legs held rigidly from the hips; we attempt to produce pain on resisted movements of the legs or trunk; or movements of any kind—flexion, extension, or rotation. Next we should examine the abdomen for visceral disease or growths. A rectal examination should be made, and, in women, a thorough vaginal examination. The patient is now ready for the *x*-ray.

Of course, cutaneous lesions, ulcers, and contusions, which

could be the cause of pain in the lumbar region, are at once apparent and present no difficulties. Myalgic pains may be the result of overwork, contusion or strain, or they may be due to exposure in lithemic individuals, or to acute infectious disorders, circulatory disturbances, lead, mercury, syphilis or alcohol. Muscle pain is made worse by motion, pressure and cold; lessened by rest and heat. A complaint of "lumbago" lasting over a few days warrants an examination of the nervous system, a search for muscle wasting, a rectal examination, and, in women, a vaginal examination. Lumbago or myalgia of the lumbar muscles is likely to start suddenly. The pain is either sharp and stabbing or dull and aching. Usually, there is no fever, and the attack lasts but a few days. Spondylitis deformans causes continuous pain and tenderness in the spine. There is fixation of the vertebral articulation with a kyphotic deformity in which the spine is bent forward in a single curve. The posterior nerve roots are compressed and the pain is severe. Muscular atrophy and ascending degeneration of the cord follow.

Trauma to the spinal ligaments and muscles is often the cause of the pain. Here there is a history of a twist, wrench, or some violent muscular effort. The pain is accentuated by motion and, if due to a railway accident, often accompanied by shock or hysterical excitement. There is muscle rigidity; no paralysis, unless the cord is damaged. Micturition and defecation, however, may be interfered with temporarily in sprain of the back. Traumatic neurasthenia or traumatic hysteria sometimes follows a sprain of the back. In the former the patient's pain in the lumbar region is accompanied by paresthesia and numbness in the legs, sexual irregularities, eye-strain, insomnia, dyspepsia, confusion, and mental depression. With the lumbar pain of hysteria there are the stigmas of hysteria, such as pharyngeal anesthesia and contraction of the visual field. It is dangerous to blame these symptoms upon the patient's imagination rather than to make a careful and serious examination. Dana says that there is no such thing as imaginary pain—that there must be some morbid underlying condition.

More or less local pain follows trauma to the lumbar spine. Of course the gravity of the injury to the spine depends entirely upon the condition of the contained cord. Between the eleventh dorsal and first lumbar vertebræ are the spinal segments representing the lumbar, sacral, and coccygeal nerves. If, therefore, the lower dorsal and upper lumbar vertebræ are injured, complete paralysis within the distribution of the lumbar and sacral plexuses is likely to follow. Injury to the conus medullaris, resulting usually from a fall in the sitting posture, is characterized by anesthesia in a saddle-shaped area over the buttocks, back of the thighs, perineum, scrotum, and penis. As the spinal cord ends opposite the lower border of the first lumbar vertebra, injuries to the spine below this level involve the cauda equina only. Where the latter is injured all the muscles of the lower extremity are paralyzed, with the exception of those supplied by the anterior, superior, gluteal, and obturator nerves. The perineal muscles and those of the penis are involved. There is anesthesia in the penis, perineum, scrotum, lower half of the buttock, and the entire lower extremity, except the front and outer aspects of the thigh, which are supplied by the external cutaneous nerve, and the cutaneous branches of the anterior crural. Bladder and rectal control are lost.

As the result of direct violence, a transverse process of a lumbar vertebra may be chipped off and there is persistent pain in the back. The diagnosis is usually made by the *x*-ray.

A fall from a height with the patient landing on the buttock will often produce a fracture in the lumbar region. There is usually a marked projection of the spinous process of the involved vertebra and local tenderness. Dislocation of the lumbar vertebra without fracture is almost unheard of. Fracture dislocation in the dorsolumbar region usually results from forced flexion of the spine, as when a man who is in the stooping position is struck on the shoulders by a heavy weight. Usually the cord is damaged beyond repair. Stab wounds and gun-shot wounds are practically equivalent to compound fractures of the spine. As Treves has pointed out, several factors in the lumbar region

render injury to the cord here unusual. The cord only reaches to the inferior border of the first vertebra; the vertebral bodies are large and cancellous so as to stand crushing without displacement; the cord here is covered by large intervertebral disks and protected by the massive muscles of the back; the cords of the cauda equina, by their looseness and toughness, lessen the effects of injury to such portion of the spinal cord as may extend into the lumbar region.

In dorsolumbar Pott's disease there is a dull, aching pain increased by any form of motion. Pain is often referred to the abdomen, and "belly-ache" is a well-known symptom. This condition in its early stage is sometimes diagnosed lumbago. The pain also shoots down into the buttocks and into the leg. If the child (it usually is a child) be placed on its back and lifted by the heels the spine remains rigid. Any projection of the spine due to rickets disappears when this test is applied, while the projection of tuberculous disease remains. Sprain and disease of the sacrolumbar articulation are both uncommon. Pott's disease in this region seldom produces pain or deformity. Associated pain, however, in the sciatic nerve may cause a diagnosis of sciatica to be made in lumbosacral Pott's disease. To test the sacrolumbar joint for pain the patient should be prone with the hips fixed. If now the shoulders are raised any pain produced suggests lumbar or scarolumbar disease, as in sacro-iliac involvement this movement is often painless.

Disease of the sacro-iliac joint is the result of trauma or tuberculosis. The tuberculosis in this region is never primary, usually being secondary to iliopsoas abscess from disease of the spine, ilium, or hip. Pain is felt on standing, walking, or sitting, as the sacrum in all these positions bears the weight of all superincumbent structures, and on account of its shape transmits it to the sacro-iliac synchondrosis. Pain is increased by coughing, straining, or twisting the loins—in a word, by anything that causes the muscles attached to the ilium to act. The superior gluteal nerve is in relation with the front of the joint and therefore pain is often felt in the buttock, and there is wasting of the

deep gluteal muscles. The patient inclines his body toward the sound side and in this manner lessens the pressure on the diseased joint when sitting. While standing, the inclination of the body toward the sound side separates the joint surfaces by the weight of the lower limbs. Lengthening only is apparent, due to the downward rotation of the innominate bone of the affected side. The measurements from the anterior superior spines to the malleoli will be the same. Tenderness on direct pressure is produced just below the posterior iliac spine; on indirect pressure, by squeezing the ilia together, or by separating them so as to put the anterior ligament on the stretch.

Gummatous disease of the vertebra is most common in the upper cervical region. Other evidences of tertiary syphilis are present. The bone is early destroyed, but there is rarely abscess formation.

Sarcoma is liable to be mistaken for Pott's disease or arthritis deformans. The pain is more intense in sarcoma and the progress of the disease is absolutely uninfluenced by local treatment. If the tumor encroaches upon the spinal canal, of course, there will be cord symptoms. The sacrum, however, is the most usual sight for sarcoma and here pressure on the nerves causes symptoms of sciatica. A rectal examination will usually clear up the difficulty.

Secondary carcinoma is not uncommon, especially after advanced scirrhus of the breast. There is severe pain, both locally and referred, along the nerves emerging from the affected vertebræ. There is extended softening of bone, as in Pott's disease, and there may be very rapid paralysis.

Hydatid cysts, actinomycosis and blastomycosis may occur in the spine and are extremely difficult to differentiate from Pott's disease.

Typhoid spine may cause extreme pain and tenderness in the lumbar region. The patient is usually convalescing from typhoid fever and the *x*-rays reveal inflammatory changes in the bones. The condition may go on to suppuration.

Hysterical spine is encountered usually in females under

thirty. Pain is complained of, perhaps, in the dorsolumbar region. The free movement of the spine and the absence of rigidity will exclude Pott's disease.

Acute osteomyelitis may attack the lumbar region. It is usually in young people. There is severe localized pain with a marked rise in temperature. Pus forms rapidly as a rule. There is a mild form in which the periosteum is involved and which does not suppurate. The suppurative form is usually diagnosed postmortem.

Coccydynia may be the result of a kick or a blow, or, in women, the result of childbirth. It may be neuralgic in character and referrable to the fifth sacral and the coccygeal nerves, or the terminal branches of the sacral plexus. It may be present with sacral pain as a result of fissure or ulcer in ano, urethral or prostatic trouble, or, in women, accompany uterine and ovarian inflammation. Rectal examination will show whether the coccyx is fractured or not; whether the sacrococcygeal joint is strained or dislocated, or not. Pain is complained of on sitting or walking and during defecation. The attachment of the gluteus maximus makes a change from a sitting to a standing posture, or the reverse, painful. There is pain if long steps are taken, or running is attempted, and this is aggravated by the action of the hamstring muscles, through the medium of the great sacrosciatic ligament. As the fixed point of the external sphincter is at the tip of the coccyx and as the levator ani is inserted into the sides of the tip, defecation is associated with movement in this joint and, therefore, with pain.

Tumors of the spinal cord or its membranes may cause pain in the lumbar region. It is difficult to tell before operation whether the tumor is in the cord substance, in the meninges, or in the tissues between the dura and the bone, or in the bone and pressing on the cord. Tumors in the substance of the cord are usually tuberculomas, gliomas, sarcomas, or gummas, and are seldom operable. Most meningeal tumors are primary sarcomas. Fibromas and hydatid cysts are also seen in the meninges. Extradural growths are rare, usually being sarcomas

and lipomas. The symptoms depend upon whether the growth presses on nerve roots, one half, or both halves of the cord. Nerve-root pressure is characteristic of extramedullary tumors. There is pain which passes around the body or shoots down the legs. When the cord is pressed upon, one of the first symptoms is intense neuralgic pain related to the segment first involved. The pain is at first unilateral, but later, bilateral. In intramedullary tumors the pain is less severe, rarely an early symptom and not, as a rule, referrable to individual nerve roots. Other symptoms are motor paresis, complete paralysis, spastic paraplegia, and loss of sensations with trophic changes. Gumma should be carefully excluded.

Sir Victor Horsely, in 1909, described a pachymeningitis which apears in the lumbar region and which he termed "chronic spinal meningitis." In this condition the cerebrospinal fluid is under great tension; there is pain and weakness in the legs and sometimes a slight kyphotic projection. Pain is diffuse and there is a progressive spasticity. The pain in the spine is not aggravated by movement. There are no pressure sores. In acute spinal meningitis there are cramp-like spasms in muscles of the back and legs and increased reflex excitability, sometimes simulating tetanus. There is also rigidity of the cervical muscles with retraction of the neck.

If pain in the pelvis or sacrum is the result of fracture there is a history of great trauma, and the injury is direct, as in crushing accidents, or transmitted through the spine or lower extremities. When the false pelvis is involved there is little or no displacement and the injury is not serious. If, however, the fracture is comminuted the abdominal viscera may be lacerated. If there is pain in the sacral region, the buttocks, the back or inner part of the thigh, or the knee, we may suspect a vertical fracture of the ilium or sacro-iliac dislocation, because the superior gluteal, lumbosacral, upper sacral, and the obturator nerves are in relation with the anterior surface of the sacro-iliac joint. Pain, marked ecchymosis, tenderness and swelling over the sacro-iliac regions posteriorly lead us to suspect tearing of the posterior ligaments,

or fracture by attachment. Other fractures are through the lateral expanses of the ilia. The epiphyses chiefly separated are those of the iliac crest, anterior superior spine, posterior superior spine, and anterior inferior spine. If the true pelvis is fractured the pain is accompanied by more or less shock. There is a history of violent force. The pain is increased by coughing, straining, or by any endeavor to move. To find crepitus insert a finger into the rectum or vagina, and with the other hand gently move the ilium. The usual seat of these fractures is through the obturator foramen, the ascending ramus of the ischium, and the horizontal ramus of the pubis being broken. Fracture of the horizontal rami of the pubis is more common than dislocation of the symphysis, because of the great strength of the anterior ligament. The acetabulum or the ischial tuberosity may be broken. The innominate bone may be separated into its three component parts. This does not take place after the seventeenth year, because by that time, as Treves has pointed out, the Y-shaped cartilage is usually completely ossified and the three bones are solidly united. In these cases the patient is examined carefully to determine whether the bowel, bladder, urethra, or vagina is injured. "The trauma causing the fracture may at the same time occasion a rupture of the kidney" (Scudder), and if the tear is a severe one there will be great shock and often the general symptoms of hemorrhage. In intraperitoneal rupture the bleeding is profuse and often fatal. In laceration of the kidney there is severe pain in the lumbar region, and this pain shoots into the testicles. There is also tenderness in the loin. There may be fulness in the loin. Frequent and painful urination, or suppression of urine may be symptomatic of this condition. If the rupture is intraperitoneal, or the ureter is torn there is no hematuria, but there may be signs of great internal hemorrhage, such as rapid, irregular pulse, sighing, respiration, etc. On the other hand, hematuria may simply mean contusion of the kidney. If hematuria exists, catheterize the ureters. If the bowel is lacerated, there will be signs of peritonitis. Bleeding from the vagina or rectum points to laceration of these parts.

If the rectum is lacerated, the blood escapes externally or into the peritoneal cavity. In rupture of the urethra, either the patient cannot urinate, or urinates with great difficulty and pain. The amount of urine is small and contains considerable quantities of blood. If there is a complete tear of the membranous urethra, a metal catheter will be caugt in it; if such a tear is incomplete, or the bladder is torn, the catheter will pass through the entire urethra. Twenty-four to forty-eight hours after the rupture, the scrotum and perineum are infiltrated, and there are symptoms of beginning sepsis. If the bladder is ruptured intraperitoneally, there is difficulty in urinating or retention and the metal catheter will pass into the bladder—unless the urethra is also torn. In extraperitoneal tears there is dysuria or retention, and there is rapidly increasing dulness over the pubes. If we diagnose rupture of the bladder, a suprapubic incision will tell us whether it is intra- or extraperitoneal. The bloodvessels most frequently torn in fracture of the pelvis are the common iliac, the superior gluteal, internal pudic, and obturator arteries and veins. "Thomas Bryant has reported three cases of thrombosis of the external iliac artery. There is always danger of pulmonary embolism due to thrombus detached from one of the large pelvic veins" (Eisendrath).

The symptoms of fracture of the sacrum are local pain, irregularity of the sacral spines, ecchymosis, and crepitus. Incontinence of feces and retention of urine are sometimes present. The rectum may be torn or the sacral plexus pressed upon. The latter condition will cause paralysis in the distribution of the plexus.

Lumbar pain is a prominent symptom of diseases of the urinary tract. In perinephric abscess there is pain in the loin radiating to the lower abdomen, genitalia or thigh, that is, in the distribution of the iliohypogastric, ilio-inguinal, anterior crural, obturator, and other branches of the lumbar plexus. One can often detect the presence of a mass in the loin and the patient has fever and muscular rigidity. To understand the symptoms

of renal calculus, one must have an appreciation of the renal reflexes,—*i. e.*, of the association of the small and lesser splanchnics and the tenth to the twelfth dorsal and first lumbar spinal segments with the sensory and motor nerves derived from the same segments. Some of the symptoms are pain radiating to the genitalia, vesical irritability, nausea and vomiting, rectal tenesmus, and retraction of the testicle. Of course, if the stone is in the parenchyma and is smooth, there may not be any symptoms. Generally, however, there is lumbar pain, increased by motion. When the stone is in the pelvis of the kidney, it causes pyelitis with pyuria, hematuria, and frequent urination. If it passes down the ureter, the patient has renal colic characterized by sudden, violent, intermittent pain going from the loin along the ureter into the testicle; there is vomiting, collapse, strangury, and blood (macroscopic or microscopic) in the urine. The most certain means of diagnosis is the skiagram—and even that is none too reliable. Some of the conditions that give shadows which may be mistaken for ureteral calculus are: Phleboliths; calcified areas in mesenteric glands; atheromatous patches in the iliac arteries; a calcified concretion in the appendix. If in doubt, pass a metal impregnated bougie into the ureter and take a second radiogram. Time does not permit me to do more than indicate the various urinary conditions in which lumbar pain is a symptom. Some of these conditions are: Movable kidney, which may be palpated; pyelitis, in which there is kidney tenderness, pyuria, and fever; tuberculosis of the kidney, in which there is slight pain, enlarged kidney, pyuria and, perhaps, nodules in the epididymis, vas, or seminal vesicle. Tumors of the kidney are hypernephroma, carcinoma, sarcoma, angioma, papilloma, and adenoma, and give the symptoms of pain and the presence of an enlargement in the loin. The growth is behind the colon, has the shape of the kidney, and moves slightly with respiration. In retention of urine there is pain and frequent straining efforts, and the bladder may be seen and palpated over the pubes. The pain due to cystitis, or stone in the bladder, or

other vesical irritant, is accompanied by frequent urination. Frequent urination in these conditions is due to the stimulus of the sensory nerves supplied by the third and fourth sacral nerves from the second, third, and fourth sacral segments of the cord. The motor impulse reaches the bladder from the eleventh and twelfth dorsal and first lumbar segments through the hypogastric and pelvic plexuses. The skin of the scrotum, penis, and urethral mucous membrane is supplied with sensation from the same spinal segments as is the bladder, and therefore referred pains in vesicle irritation or inflammation are often felt in those regions in the distribution of the perineal branches of the pubic and inferior gluteal nerves. As the inferior hemorrhoidal nerve—supplying the skin over the external sphincter ani and about the anus—is often derived from the sacral plexus, itching or tickling in that region, or painful spasm of the anal sphincter may be caused by vesical irritation. Bladder pain is referred to the lumbosacral region through the communication between the second, third and fourth sacral nerves and the hypogastric plexus. Vesical pain is referred to the kidney by the junction in the spermatic plexus of filaments from the vesical and renal plexuses.

Prostatic referred pains are common, and, due to the derivation of the nerve supply of the prostate from the lower three dorsal and upper three sacral segments, are apt to be widely distributed, as, for example, pain over the tip of the last rib (tenth dorsal nerve), over the posterior iliac spine (eleventh dorsal nerve).

Apart from gynecological conditions, pelvic pain may be due to the following causes: Inflammatory diseases or tumors of the sigmoid; constipation, due to local obstruction in the pelvis from a horizontal position of the broad ligament on which the pelvic colon is apt to kink; to disease processes invading the walls of the veins. There is a neuralgic-like pain due to distention of the pampiniform plexus, resembling the pain of some cases of varicocele in men. Adhesions of the sigmoid to the tube and broad ligament cause severe pelvic pain. Local tuberculous

peritonitis must be thought of in connection with persistent pelvic pain.

Cancer of the rectum, if it extends toward the hollow of the sacrum, will press on the sacral plexus, causing a pain which may suggest sciatica, lumbago, sacro-iliac disease, or coxalgia.

An acute diverticulitis of the sigmoid has the symptoms of a left-sided appendicitis, and a chronic diverticulitis may resemble scirrhus carcinoma. When an inflamed appendix lies behind the ascending colon, pain may be referred to the lumbar region.

In inflammation of the intra-abdominal portion of the vas deferens, the pain may be deep down in the pelvis, or over Poupart's ligament. There is usually a history of gonorrhea or mumps. A rectal examination should be made.

Sacral pain usually means intrapelvic trouble, disease of the testicle, prostate, rectum, or hip.

An abdominal aneurysm may cause pain in the lumbar region and defy diagnosis until it has ruptured into the retroperitoneal tissues.

Humphrey Davy Rolleston, speaking of gall-stone colic, says that "the entrance of the calculus into the cystic duct sets up severe muscular spasm and pain in the right loin and back." The same author states that pain may be felt in the loins when there is a malignant tumor of the liver.

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DISCUSSION

Dr. James Tyson: It is evident from what has been said that quite a large number of diverse conditions may be classed under this heading. In the more usual form of the condition termed lumbago it appears to me that the views of Gowers expressed by Dr. Henry are as nearly correct as one can have them; that is, that it is really a fibrositis, affecting not only the muscular substance proper, but the intermuscular fibrous tissue which surrounds it and pervades it. But in looking for the explanation of some of the modifications of this form of the disease, particularly the variety which is known as hexenschuss or the *witch's shot* of the German, it has appeared to me that the similarity between it and cramp is sufficiently striking to call for allusion. Anyone who has had an attack of lumbago will realize in the suddenness and the intensity of the pain its close resemblance to cramp of the calf muscles. The slight movement of the body similar to that which will produce the cramp in the leg, the very great suddenness of the occurrence of the lumbar pain, and the rigidity of the muscle in both places are other points of resemblance. There are no two conditions that so closely resemble each other as the pain of lumbago and that of cramp of the calf muscles.

Dr. A. B. Hirsh: It is only necessary to listen to the great variety of causes of lumbar pain just described to realize what a large subject we have before us this evening. I should like to speak of a few non-surgical phases of lumbar pain—*i. e.*, those not dependent on morbid growths or bone involvement. In differentiating the kinds of aches in the lumbar region, one usually finds it best to try manual pressure, going over the separate groups of muscles in succession; then if there is no result from this procedure it is followed by a slow sinusoidal current of moderately high voltage which will usually pick out the painful areas. It is sometimes possible, by having the patient bend suddenly and in definite directions, to pick out the affected muscles. Another method to accomplish this is with the aid of vibrissage, passing the button vibratode along the spine, usually between the transverse processes of vertebra in the painful area.

Acupuncture has been mentioned for relief of these cases and some of us recall with interest the success of Dr. Robert Bartholow's efforts with this procedure. Dr. J. Clinton Starbuch tells me of having within the past week treated two cases by acupuncture with almost immediate relief. My method is less painful, possibly more expeditious, and the result is marked. With the patient placed within a heavy band, something like the surcingle of a saddle, enclosing the painful area and attached to the eccentrics of an oscillator, run by a small electric motor, it is astonishing how this oscillation, which can be graduated as to speed and intensity, rapidly gives relief. Within three or four minutes the pain will have disappeared and motion in all directions become unrestricted. Sometimes following the acute attacks soreness will arise in other areas. The static spark applied under protection of a "director" to these muscles relaxes spasm and thus, with the "wave" current locally applied, gives relief. Massage, in view of the methods I have described, becomes antiquated.

AN ASSYRIAN MEDICAL TABLET IN THE POSSESSION OF THE COLLEGE OF PHYSICIANS[1]

By MORRIS JASTROW, Jr., Ph.D., LL.D.

Outside of the medical section of the royal library of Nineveh, discovered by Sir Austen Henry Layard in the year 1849, in the mound Kouyunjik (opposite Mosul), the site of the ancient city of Nineveh,[2] very few Babylonian or Assyrian medical texts

[1] Read before the Section on Medical History, December 16, 1913.

[2] For an account of the discovery and a general survey of the scope of the collection, see Bezold's Introduction in vol. v of his magnificent *Catalogue of the Cuneiform Tablets in the Kouyunjik Collection of the British Museum* (London, 1889–1899). Supplemental to Layard's excavations, further searches for tablets in the mound were made by Sir Henry C. Rawlinson, Hormuzd Rassam, George Smith, and E. A. Wallis Budge, so that at present over 20,000 tablets and fragments of tablets of the library have been recovered and brought to the British Museum. Included in the collection covering all branches of literature are about 800 medical texts of which, up to the present, only a small proportion have been published, viz.: (1) *Cuneiform Texts from Babylonian Tablets, etc., in the British Museum*, Part xxiii (London, 1906) and (2) Friedrich Küchler, *Beiträge zur Kenntniss der Babylonisch-Assyrischen Medizin* (Leipzig, 1904), containing three extensive texts. A publication of some 500 medical tablets of the Kouyunjik collection is in course of preparation by Mr. R. C. Thompson, to whom we owe the copies in the former of the two works mentioned. Owing to the close affiliation between incantation and medical texts, it was not possible at the time of the compilation of Bezold's catalogue to sharply differentiate between these two classes of texts. Even in *Cuneiform Texts*, Part xxiii, some of the texts, as Pl. 1–22, might with equal propriety be classed among incantation rites, which almost invariably accompanied medical treatment. Until, therefore, all of the tablets classed by Bezold under "Ceremonies and Rites" (Index, pp. 1998–1999), "Ceremonies and Rites to be Performed for the Benefit of Sick People" (p. 1997), and "Incantations" (p. 2051 *seq.*) shall have been studied in detail, it will not be possible to estimate the exact number of medical tablets, *i. e.*, such in which medical treatment is prescribed, in Ashurbanapal's collection. The number will be between 800 and 1000 tablets and fragments. For a general sketch of Babylonian-Assyrian medicine, see the writer's article in the *Proc. of the Royal Society of Medicine*, for March, 1914.

have as yet come to light. No doubt this is accidental, for the medical texts in the great collection formed chiefly by King Ashurbanapal (668–626 B.C.)[1] and placed in his palace, represent copies from Babylonian originals—as do the large majority of texts covering other branches of literature—reverting to a much older period, so that there is every reason to expect the discovery of medical texts in the archives of the Babylonian temples, as excavations in the mounds of the Euphrates Valley proceed. The Louvre does not appear to have any medical tablets. The University of Pennsylvania Museum of Archæology is fortunate in having two medical tablets, one of the neo-Babylonian period, in fairly good condition but without a colophon, the other appearing to be far older, but so badly preserved that only a few words can be read here and there. Both these tablets were found in the course of excavations at Nippur,[2] as was also one—now in the Constantinople Museum—of which Scheil gave a brief account.[3]

The College of Physicians of Philadelphia is therefore fortunate in having acquired, somewhat over a year ago, an Assyrian medical text which, apart from the unusual interest of its contents, is unique insofar as it has a colophon which shows the tablet to have been a private one in the possession of an individual who held some official position, and who, it is fair to suppose, was also a physician. But for this colophon, we might have supposed the tablet to have formed part of the Kouyunjik collection, for the characters are like those of the seventh century B.C. in Assyria, and the color of the clay—a light red—also suggests

[1] The collection appears to have been begun by Sargon (720–705 B.C.), the great-grandfather of Ashurbanapal, but it was during the latter's reign that the bulk of the library was gathered by the scribes of the king, who were sent to the temple archives of Babylonia—chiefly Babylon, Borsippa, Sippar, Uruk, and Nippur—to make copies of the literary and scientific productions of the past.

[2] The neo-Babylonian tablet from the second expedition bears the Museum number 3733; the older one from the fourth expedition, No. 19,801.

[3] Recueil de Travaux relatifs à la Philologie et à l'Archèologie Egyptiennes et Assyriennes, vol. xii, pp. 160 *seq.* A number of medical texts are now being offered for sale by dealers.

the tablets of the royal library. There is no reason to question the statement of the dealer that the tablet was found at Kaleh-Shergat,[1] the site of the ancient city of Ashur, the capital of the Assyrian empire in the oldest period,[2] where the German Orient Society has been conducting excavations since 1900. The tablet measures 9 cm. by 14.5 cm. On the obverse, forty-five lines are pretty well preserved, and on the reverse, forty-three lines, including the two lines of the colophon, are to be distinguished, but this side of the tablet is badly weather-beaten, and were it not for a fortunate chance to be mentioned presently, would be for the most part undecipherable. The colophon furnishes the name of the owner of the tablet, his genealogy, and official position. Unfortunately a few signs are lacking, so that there is a certain doubt as to the office which he held. These two lines read as follows:

duppu Nabû-zêr-kitti-lîšir[3] apal Mar-di-[i][4]
apal Aplâ (amêlu)[5] [šangû (?)] rabû ša (šarri)[6]

i. e.,

Tablet of Nabû-zêr-kitti-lîšir, son of Mardî
Son of Aplâ, the high [priest (?) of the King (?)]

[1] The negotiations with the dealer were conducted by me through Canon C. H. W. Johns, who called my attention to this tablet, which was purchased by Drs. S. Weir Mitchell and R. H. Harte in 1912, and presented by them to the College of Physicians.

[2] Nineveh did not become the capital of Assyria until the ninth century B.C

[3] On this name see Tallqvist, *Neubabylonisches Namenbuch*, p. 154a and 265a (Nabû-zêr-kit-ti-lîšir), to which Prof. Ungnad called my attention, and which definitely settles the reading of the second element in the name as *zer* and not *mu*, which would also be possible. *Cf.* also *ibidem*, p. 154a and 319a. This name also occurs, as the writer of a letter (82, 5–22, 150) to the King, published by Harper, *Assyrian and Babylonian Letters*, Part XI, No. 1107, who may, in fact, be identical with the writer of our medical tablet.

[4] For this name, see Bezold's *Catalogue of the Cuneiform Tablets in the Kouyunjik Collection of the British Museum*, Index, p. 2107a.

[5] Prof. Ungnad, who kindly examined the colophon with me, is of the opinion that the traces of the sign after Lu (= *amêlu*) point to Šid = *šangû* "priest." The title *šangû rabû* "high priest" is of frequent occurrence in Assyrian legal documents, *e. g.*, Johns, *Assyrian Deeds and Documents* No. 657, rev. 4.

[6] Or of some deity like Johns, *Ibidem*, No. 641, rev. 11–12.

The colophon thus definitely establishes the tablet as one which was in the private possession of an official who, to judge from the characters of the inscription, flourished in the days of the later Assyrian empire—in the seventh century B.C. at the latest. If the suggestion of Prof. Ungnad turns out to be correct, that the title of Nabû-zêr-kitti-lîšir is to be read as the "high priest," it would strengthen the supposition that the owner of the tablet was a physician, in view of the close affiliation of medical treatment with the priesthood; but even if the office held by our Nabû-zêr-kitti-lîšir should turn out to be a secular one, it would not be incompatible with his being a physician, for we find in a letter from a physician that a colleague is referred to as holding the office of Rab-Mugi,[1] which is a secular post and apparently connected with the military division of the government.[2]

The tablet itself turns out to be an extract made by the copyist from a large series of medical prescriptions, interspersed with incantations and magic rites, which down to the latest period of Babylonian-Assyrian culture accompanied medical treatment. The series known from the opening words, "When a man has a fever," covered at least five tablets. Portions of the first four tablets have been published in the British Museum Series of Cuneiform Texts,[3] and a comparison of this publication shows that the copyist of our tablet has made his extracts from tablets I to III of the series—selecting such prescriptions and incantations and magic rites as he presumably regarded as most efficacious; and it is a fair inference that his purpose in doing so was to have a tablet on hand to which he could refer in his medical practice. Owing to the fortunate accident of our tablet thus turning out to be an extract from a series already known to us,

[1] Harper, No. 108, rev. 3.

[2] See Klauber, *Assyrisches Beamtentum*, p. 52, note 2. The title is identical with the Rab-Mag mentioned by Jeremiah 39, 3, and 13.

[3] *Cuneiform Texts from Babylonian Tablets, etc., in the British Museum*, Part xxiii, Pl. 23–50 (London, 1906). An unpublished fragment belonging to the same series, and forming Tablet III, is K4023, of which K7642 is a duplicate. Other fragments belonging to the series are enumerated in Bezold, *Catalogue, etc.*, index, p. 2051b; no doubt this list can be further extended.

it is possible to restore those portions of the obverse which are broken out or badly preserved, and also to read most of the badly weather-beaten reverse.[1] In return, our tablet enables us

[1] The relationship of our tablet to Tablets I to III of the series is in detail as follows:

From Tablet I

Obverse lines	1–6	=	Cuneiform Texts, xxiii, Pl. 23, lines 1–5
"	7	=	" xxiii, Pl. 24, " 18 (?)
"	8	=	" xxiii, Pl. 24, " 21
"	9–17	=	" xxiii, Pl. 26, " 4–9
"	18–20	=	" xxiii, Pl. 32, " 8–9
"	21–26	=	" xxiii, Pl. 33, " 10–13
"	27–30	=	" xxiii, Pl. 34, " 29–31
"	31		Missing in Cuneiform Texts, xxiii
"	32–34	=	Cuneiform Texts, xxiii, Pl. 38, col. iv, 26–28
"	35		Missing in Cuneiform Texts, xxiii
"	36–39	=	Cuneiform Texts, xxiii, Pl. 38, col. iv, 32–34
"	40		Missing in Cuneiform Texts, xxiii
"	41–42	=	Cuneiform Texts, xxiii, Pl. 38, col. iv, 35–36
"	43–45	=	" xxiii, Pl. 38, col. iv, 38–41 (?)

From Tablet II

Reverse lines	1–3	=	Missing in Cuneiform Texts, xxiii
"	4–7	=	Cuneiform Texts, xxiii, Pl. 39, lines 7–9
"	8	=	" xxiii, Pl. 40, " 25
"	9–12	=	" xxiii, Pl. 42, " 16–18
"	13–15	=	" xxiii, Pl. 41, " Col. ii, 2–3
"	16–18	=	" xxiii, Pl. 42, " 8–9
"	17–27	=	" xxiii, Pl. 45, " 6–13
"	28		Missing in Cuneiform Texts, xxiii
"	29–33	=	Cuneiform Texts, xxiii, Pl. 49, lines 1–5

From Tablet III

"	34–39	=	Obverse of K4023—an unpublished portion of Tablet III.
"	40		*cf.* Cuneiform Texts, xxiii, Pl. 49, 5 and 7

to settle many doubtful readings in the large series, and to fill up quite a number of gaps, besides furnishing some variants. The transliterated text of our tablet is as follows:[1]

TRANSLITERATION

Obverse

1 [enuma amêlu] ina eli-šu išâtu [u-kal bu'ânu Zi pûti ibaši-ma ênâ-šu i-par]
[ênâ-šu bir]-ra-tam i-pi-tam i-[ši-tam mur]-tin-na ḳu-ḳa-na-[ša-a]
[u] dimta inadâ šullultu Ḳa siḫ[li bu-ṭu-tu ina (Na) erû taḫašal]
tašaḫal rêš-ka u-kal ina libbi šullultu Ḳa [teleḳḳi ina mê kasî talâš]
5 ḳaḳḳad-su takalap taṣamid-ma ûm 3 (kam) [la tapaṭar]
šulultu Ḳa siḫli šullultu Ḳa lapti ina mê [kasî] talâš takalap taṣamid-ma [ûm 3 (kam) la tapaṭar]
. . . . . (Na) šadî ina ḫimêti (?) Rat teleḳḳi
(ḫimêti ?) ina šamni Rat ina Kip-Kip-Uš bullulu Rat teleḳḳi
* * * [2] Ḫu-si ša Ib-Ḫu ina [lipî (Šim)] kanaktu (Šim) Gam-ma mû (Šam) Si-Di
10 [imbû ṭâbti] (Giš) zêr bîni[3] (Šam) [maštakal] * * ḳêm Pa (Giš) bîni ṭâbtu Eme-Sal (lim)

[1] The restored portions, on the basis of a comparison with *Cun. Texts*, xxiii, are placed in brackets; my conjectural restorations in parentheses. In the transliteration š = sh; ḫ = ch or kh. Capitals indicate Sumerian words; determinatives like Giš = wood, Šam = plant, Na = stone, Šim = herb are placed in parentheses. For the photograph and copy of the text, see the Plates at the end of this article. I am under obligations to my pupil, Dr. Edward Chiera, who kindly autographed the text on the basis of my copy. He also aided me with the help of his sharper vision in identifying a number of doubtful signs.

[2] *Cun. Texts*, xxiii, Pl. 36, 50 we find *kit-li-e* before Ḫu-Si, and the traces in Pl. 26, 4 point in the same direction, at least to *kit-li*, which would then be the reading also in our text. Unfortunately in line 19 where Ḫu-Si ša Ib-Ḫu occurs again, no traces of the sign before Ḫu remain. Of the three other passages in which Ḫu-Si ša Ib-Ḫu is found, in two (KK 71b, etc., ii, 46 and iv, 22; Küchler, *Beiträge zur Kenntniss der Assyrisch-Bablonischen Medizin*, pp. 24 and 36), the combination appears without a determinative; in the third passage (KK 62, etc., i, 24, Küchler, ibid., p. 44) it is preceded by the sign for 'plant.'

[3] So our text, but this is a slip on the part of the copyist. The correct place for the sign '*zêr*' is after *bîni* as in *Cun. Texts*, xxiii, pl. 26, 4.

[(Šam) Kur-ra (Šam) nînû (Šam) zibû ma-la ni-iš ênâ]-šu ka-šu-ti tamaḫaṣ-[ma]

[ênâ-šu ina uḫûli ḳarnâni tamasi adi dimtu iptarasû] te-ki-tam-ma naṣmati-šu teleḳḳi

[arki-šu ina šubtî la ipti-šu mû (Gis) kibti tabašal] ana (Duk) Kan-Šar te-šib

[ina kakkabi ḳarâbi ina še-rim ḳaḳḳad-su tapašaš] mû (Giš) kibti [tabašal]

[naṣmat ḳaḳḳadi-šu tu-kar-ra-ar] ḳaḳḳad-su zibbatu [pušikki takalap]

[** šamni ana ḳaḳḳadi-šu tašapak ina biti ša] ta-ra-nam ibašû tušêšib-šu

[ûm 3 (kam) an-nam] têpuš

[ênuma amêlu ḳaḳḳadu-šu išâtu uḫammaṭ] šârtu tapaṭar ḳaḳḳadu-šu i-šaḫ-ḫu-uḫ

[Zi pûti ibašû] * * Ḫu-Si ša Ib-Ḫu ina šamni Rat ḳaḳḳadu-šu takalap

[tu-ḳaṣṣa-ṣa taṣamid]-ma ûm 3 (kam) la tapaṭar

[enuma Ù . . . . .] 10 šiḳlu ḳêm (Giš) šur-man 10 šiḳlu kêm (Šim[1]) su'adu

[10 šiḳlu ḳêm (Šim) burâši 10 šiḳlu ḳêm (Šim[2])] kukru 10 šiḳlu ḳêm kasû 10 šiḳlu ḳêm Tig-Gal

[10 šiḳlu ḳêm Tig-Tur 10 šiḳlu] suluppi 10 šiḳlu siḫli

[10 šiḳlu šikâru emêdu damḳu 10] šiḳlu ḳêm puglu išteniš tuballal ina šikâri talâš

[ḳur-ma pišâ taḫašal tašaḫal] rêš-ka u-kal ina libbi šulultu Ḳa teleḳḳi

[ina kasî] talâš takalap taṣamid-ma Ù

[nipišu-šu] (Na) dušû (Na) sântu (Na) uknu (Na) ḫulalû (Na) pišû

[(Na) Igi-Ha] (Na) šubû (Na) šubû imitti (Na) šubû šumêli[3]

[(Na)] Kur-Nu-Dib (Na) Muš-[garru] (Na) Aš-Min (?) (Na) Muḫ-Aš-Min (?) 13 ni-be an-nu-ti

[ina šipâti nabasi tašakak] ina šipâti tarakas-ma šârtu âlikût ik-kal-la

enuma amêlu ina bu'âni zu-u-ti-šu išâtu ina ḳaḳḳadi-[šu te]-pu-uš-ma

ḳaḳḳad-su ukabbit-ma ina napišti-šu [ḳaḳḳad-su] pânu-šu pu-ta-su

(Šim) burâši (Šim) mar-gu-su (Šim) marru (Šam) šu-nu-ḳu

(Na) elît urṣi Rat ina libbi šamnu u šikâru ḳaḳḳad-su ipašašû-ma išâtu ana ḳaḳḳadi-šu i-be-li

[1] *Cun. Texts*, xxiii, Pl. 32, 10, Giš instead of Šim.

[2] *Cun. Texts*, xxiii, Pl. 33, 10 has a superfluous Li before Gam-Gam.

[3] *Cun. Texts*, xxiii, Pl. 43, 30 reads: Id Zi-Da and Id Kab-bu, *i. e.*, a 'right hand' and a 'left hand' šubû stone.

35 [enuma amêlu] ḳaḳḳadu-šu pa-nu-šu ênâ-šu (kîm)-šu šapti-šu itanapahû
kaḳḳadu-šu pânu-šu pu-ta-šu ḳâtâ-šu kîm-šu ikkal-šu
mi-na-tu-šu tap-ka-su-šu šim-ma-tu ibašû ana balâṭi-šu
(Šim) kukru (Šim) burâši (Šam) Kur-Kur zêr (Šam) Lid-Gab
kit-li-e mur-tim (Giš) aṭaru kasî ḳêm lapti
40 šikâru emêdu damḳu (Šim) nikiptu (Šim) Si-Di išteniš taḫašal tašaḫal
ina kasî talâš ḳaḳḳad-su takalap
šaman-šu pân ḳaḳḳad-su tapašaš taṣamid-ma ûm 7 la tapaṭar
enuma amêlu ḳabal ḳaḳḳadi-šu u-zaḳ-ḳa-[ta-šu][1] bir-ka-šu kabtu u-ta-
ba (?) * *
(u)-ta-na-aḫ ḫîp libbi ibaši-ma bir-[ka-šu e-ta-na-na-aḫ]
45 . . . i-za-nam-mu ik-ka-šu ik-ti-ni-(ir-ri)

Reverse

1 . . . . . ḳanû ṭâbu (Šam) Kur-Kur . . . (Giš) kibtu[2]
. . . šamni ina mê kasî ḳêm . . . . . u-ša-pa
[ina] ûmi namâri taḫašal, tašaḫal ina kasî talâš taṣamid-ma (ibaluṭ)
[enuma amêlu] pûtu iṣabat ibbaši (Šim) . . . . (Giš) šur-man (Šim)
asû ḳanû ṭâbu
5 (Šim) kukru (Šim) asû labiru (?) (Šim) asû (?) . . . (Šim) palluku (Giš)
(Šim) šimaššalu[3] (Šim) su'adu
(Šim) dirû (?) [(Šim) Ḫal[4] ḫîl (Šim) Ḫal ina (ṭâbâti] mazi[5]) tar-bak
ḳêm lapti ḳêm [kunâši a-na ši-ta-šap-paḫ ina maški tetirri] ḳaḳḳad-su
takalap taṣamid-ma ibaluṭ
(Šam) Kur-Kur ni [kip-ta ina išâti tu-ḳat-tar]-šu
šumma . . . . . .
10 taḫašal tašaḫal [šârat uniḳi la pitîti šipât] nabasi
ta-pat-til (Na) [. . . . . (Na) uknu]
[(Na) Ka-Mi šûpû ina pûtâ-šu tarakas -ma] ibaluṭ
enuma amêlu Zi [pûti nu-uḫ-ḫi êpi šamaššamni labirê (Šim)] kukru
(Šim) dirû (?) [(Šim) Ḫal ina kasî tamaḫaṣ]
15 šikâru emêdu [damḳu ḳêm ḫašâli ina šikâri tabašal tar-bak taṣamid]
enuma amêlu bu'ânu [pûti-šu iṣabat-su-ma ikalâ-šu 10 Kisal ḳêm
kanaktu]

[1] See the interesting quotation from our series in King, *Magic and Sorcery*, No. 12, 121; of also *Cun. Texts*, xxiii, Pl. 46, 27.

[2] [Giš] Še Gig-ga (?). See below p. 378, note 2.

[3] (Šim) Sal *cf.* Meissner, No. 3574.

[4] Perhaps to be read *baluḫḫu* (Meissner, No. 3576).

[5] Supplied from *Cun. Texts*, xxiii, Pl. 39, 3.

[10 Kisal ḳêm ḫašâli 10 Kisal kukru 10 Kisal kasî 10 Kisal ḳem pugli]
[10 Kisal êpi šamaššamni išteniš tuballal ina šikâri ta-la-aš pûtâ-šu taṣamid]
[enuma amêlu] ina ṣabâti-su [eṭimmu (?) Zi pûti-šu (ibaši ana balâṭi)-šu 10 šiḳlu[1] (?) (Giš) erinnu]
[10 šiḳlu] (Giš) šur-man [10 šiḳlu (Riḳ) * * 10 šiḳlu Im-Di 10 (Šim) (Gis) dup-ra-nu]
[10 šiḳlu] (Šim) [šimaššalu 10 šiḳlu (Šim) palluku (?) (10 šiḳlu) Gam-ma 10 šiḳlu (Šim) [burâši
[10 šiḳlu (Šim)] kukru 10 šiḳlu ḳanû ṭâbu (10 šiḳlu kasî) 10 šiḳlu (Šim) dirû (?)]
[10 šiḳlu ḳêm pugli 10 šiḳlu mû * * * * 10 šiḳlu šikâri emêdu damḳu]
[10 šiḳlu kit-] li-e [(10 šiḳlu (Šam)) Lid- (Gab) 10 šiḳlu Tig-Gal] 10 šiḳlu Tig-Tur
ištenis [taḫašal] tašaḫal [ina šikâri talâš 10 šiḳlu ḳêm lapti]
ina maški tetirri ḳêm kunâši . . . (ina kasî) tar-bak
ḳaḳḳad-[su ta-]kal-lap putâ-šu taṣamid-ma (ipašašû-šu[2])- ma ibaluṭ
. . tar-bak (tamaḫaṣ) sa ina šikâri ṭâbi išâti-ma ibaluṭ[3] . . . .
[šum-] ma pûtu [iṣabat-su-ma] eṭimmu ina zumri amêli il-ta-ša–as–[ma lâ ipaṭar]
ina pân[4] ṣi-in-di nap-šal-ti lâ taparas-sa
[karkû (Ḫu) bu'-u-ra] ta-ta-ba-aḫ dâmi-šu tas-us-su
[mu-še-nik-ta-šu lipâ-]šu u ki-[il-pa ša] pi-šur-ri-šu teleḳḳi
[ina išâti tuṣaḫḫar] ana libbi dâmi [(Gis) erinni] taballal-ma [šiptu 3-šu tamannu]
([enuma amêlu . . . (Šam) šur-man (Šam) arzallu (Šam) bînu ṭâbtu (?) Eme-[Sal (?)]
. . . . . ḫabbûru (Šam) nuḫurtu mešlu me-ki-e . . .
(Gis) ḫar-šu. . . (Šam) . . . (ḳanu ?) šalâli (Šam) rupuštu nâri (Na) mu-su
(Na) Gibil (Na) Gibil (pišû(?)) (Na) Gibil ṣalmu (Na) pišû (Na) Ninib (Na)[imbubu duššu]
išteniš Rat ina libbi idi[5] sibi[6]-šu tamannu-ma pûtâ-šu (pânê-)šu[7] kišad-su ina šamni ênâ-su ipašašû-[ma e-]ṭi-im inasiḫ

[1] Traces point to this reading.
[2] Crowded in above the line.
[3] An erasure at this point.
[4] Our text omits Igi.
[5] *Cf. Cun. Texts*, xxiii, Pl. 50, 13.
[6] *Cf. Cun. Texts*, xxiii, Pl. 41, 24, "seven times and seven times recite."
[7] Read according to *Cun. Texts*, xxiii, Pl. 44, col. iii, 5.

40 šiptu Šu-Ši Ḫul Gal . . . = u-ba-ni (amelûti (?)) limnu Nam-Lu-Gal-lu Ge[1]
ina eli-(šu) [tamannu]
duppu Nabû-zêr-kit-ti-lîšir apal Mar-di-[i]
apal Aplâ amêlu [šangû(?)] rabû ša (šarri(?))

TRANSLATION

Obverse

1 [When] a fever [attacks a man,[2] with a swelling of the vein of his forehead[3] and clouding his vision],[4]
[his eyes being affected] through clouded vision, [severe pain[5] (?)] (and) inflammation.

[1] Written in Sumerian, of which *amelûti* would be the translation. It is most unfortunate that the first part of the line is defective just at the same point as *Cun. Texts*, xxiii, Pl. 49, 7, the first part of which, however, can now be supplied from our text.

[2] More literally, "when a fire eats a man." It is interesting to note that in the Babylonian Talmud "fever" is also designated as a "fire." In response to the question "what is fever," a Rabbi answers, "a fire of the bones" (Talmud Babli, Berakôth, 32a). The use of the term "eat" in medical texts by the side of "seize" reflects the primitive belief upon which Babylonian-Assyrian medicine rests, that disease is due to some active demon who is actually eating some part of the body, or who has seized a part of the body in a firm grasp. As a trace of this belief in modern parlance, we still speak of a person being "seized" with a fever. The Babylonians would put it in the active and say that a fever has seized a man.

[3] Written Ša = *bu'ânu*, "sinew, joint, muscle," but also "vein" and "nerve" followed by the sign Zi = *našû*, "to be high." The vagueness in the use of the term *bu'ânu* marks a limitation in the anatomical nomenclature of the Babylonians and Assyrians. I am inclined to take the combination Sa-Zi with *pûtu*, "forehead," which occurs frequently in the series, *Cun. Texts*, xxiii, Pl. 23–50, and in other medical texts as a description of the standing out of the veins at the temples. *Cf. Cun. Texts*, xxiii, Pl. 41, 9, 15, and elsewhere. For a further discussion of *bu'ânu*, see Holma, *die Namen der Körperteile im Assyrisch-Babylonischen*, p. 4–6, who calls attention to the corresponding vague use of the term *metu* (sinew, muscle, joint, vein, nerve, etc.) in Egyptian medicine.

[4] More literally, "covering his eyes."

[5] *bir-ra-tam i-pi-tam*, for which we find, *Cun. Texts*, xxiii, Pl. 27, 1, and Pl. 46, 1, the verbal form *i-bar-ru-ra*, *i. e.*, "his eyes glow." I take *birratu ipîtu* as a compound term, descriptive of the pain in the eyes, which causes them to glow and to obscure one's vision, just as we still speak of a burning and blinding headache. At all events, the purpose of the terms, as of the following ones, is to describe a violent throbbing of the head, accompanied by fever and severe pains in the eyes, which are so inflamed as to affect the vision. *i-ši-tam mur-tin-na* (or *ḫar-tin-na*) are two obscure terms that further describe the symptoms accompanying the violent headache. The second

[and] tears[1] flow, take ⅓ of a Ḳa[2] of [chopped[3] thorn plant in "birth-stone,"[4] grind][5]

word may have the force of "violent" or "strong" suggested by *Cun. Texts*, xxiii, Pl. 33, 14, *siḫlu mur-tim* "strong thorn plant." A variant form seems to be *amurtinnu*, to judge from the passage in the Nimrod Epic, XI, 285, "Its thorn (*siḫilšu*) like a sharp point (*kîma amurtinnim*) will pierce (*usaḫḫal*) thy hand." An '*amurtinnu* wine' is referred to II Rawlinson Pl. 45, No. 4, 59, as the phonetic reading of the sign Gir, *i. e.*, "thorn," and which may therefore describe a sharp and biting beverage. *Išîtu* is derived from the same stem as *a-ša-a* at the end of the line, and which certainly means "affected" or "painful." The combination *išîtam mur-tin-na* may, therefore, be the designation of a "piercing pain." Fortunately there is no doubt of the following word *ḳûḳânu*, which is quite a common term for "inflammation."

[1] Šub-Šub. The repetition of the sign Šub = *nadû*, "flow" (Brünnow, No. 1434), points to a plural form, so that the preceding ideograph Er = *dimtu*, "tear" (Brünnow, No. 11609), must be regarded as a collective noun for "tears."

[2] Ḳa, the usual measure occurring in medical texts, by the side of Ṭu = *šiḳlu*, *i. e.*, a shekel as a weight, and of Kisal, which is a subdivision of the shekel.

[3] bu-ṭu-tu, of which, according to II Rawlinson, Pl. 23, 25 e–b, bu-ud-du-tum (= bu-ṭu-ut-tu), is a variant form, I take from *badâdu* or *batâtu* in the sense of "cut" like the corresponding Arabic *badda* or *batta*, *i. e.*, "cut up," qualifying the preceding Zak-Ḫi-Li = *siḫlu*, a thorn of some kind. The same term is used (1) to describe a cereal (Meissner, No. 4830) and (2) a kind of tree (Meissner, No. 6811). In both instances the underlying meaning would be appropriate to describe small particles of wheat or spelt or a tree of fine grain. A similar term is Ba-Ba (*za*) = *tuzâza*, "divide up" (Brünnow, No. 104), *e. g.*, *Cun. Text*s. xxiii, Pl. 43, 25 and 27.

[4] (Na) Ḫar-Ḫar is explained as *erû* in Reisner, *Sumerisch-Babylonische Hymnen*, p. 122, rev. 5 (Meissner, No. 6498), which on the basis of *Cun. Texts*, xiv, Pl. 14 (K 4396), 9, is clearly "birth-stone." Such a "birth-stone" must be regarded literally as a stone on which the woman in labor sits during the process of giving birth. The custom appears to have been widespread among the Semites, and to this day peasant women in Palestine sit on a stone during the birth throes. See Ploss-Bartels, *Das Weib* (9th ed.), II, p. 178 *seq.* There is an interesting reference to such stones in the famous passage in Exodus 1, 16, where instructions are given to the Hebrew midwives to "observe when you assist the Hebrew women in bearing and see (them) on the stones." The word used here for stones is the common term, so that there can be no question of the interpretation. The ordinary translation "and you see them on the stools" or "on the birth-stool" (revised version) is incorrect. The "birth-stool" was known to the Jews in Talmudic days, but in the passage in Exodus a more primitive custom is referred to.

[5] The sign En is either an error for Gaz = *ḫašâlu*, "grind" (Brünnow, No. 4721), occurring very frequently in medicinal texts in juxtaposition with Sim = *šaḫâlu*, "crush" (Brünnow, No. 2102), or has also the value *ḫašâlu*, though this is less likely. The combination of Gaz with Sim is very common,

(and) crush, for thy aching head [take] $\frac{1}{3}$ of a Ḳa of it, [knead with cassia juice],[1]

5 wrap around his head; attach[2] and for 3 days [do not remove].

$\frac{1}{3}$ of a Ḳa of a thorn plant,[3] $\frac{1}{3}$ of a Ḳa of turnip-flour,[4] knead with [cassia] juice, wrap around, attach and for 3 days do not remove.

* * * take mountain stone[5] compounded[6] with cream (?).

(cream (?)) with oil compound, with mixed . . . . . take,

e. g., *Cun. Texts*, xxiii, Pl. 24, 15; 26, 1; 27, 1, 22; 29, 45; 31, 66; 33, 12, etc. See also Küchler, *Beiträge zur Kenntniss der Assyrisch-Babylonischen Medizin*, p. 80, and numerous other passages in the medical texts embodied by Küchler in his work.

[1] *mû kasî*, literally "water of kasû," *i. e.*, the juice of kasû, which, as Tallqvist was the first to suggest (*Assyrische Beschwörungsserie Maqlû*, p. 140), is the equivalent of our cassia (*Cinnamomum Zeylanicum*). The Semitic origin of the Greek *Kassia*, to which our cassia directly reverts, had long been suspected by scholars, and is now confirmed by the very frequent occurrence of the term in Babylonian-Assyrian medical texts. See Löw, *Aramäische Pflanzennamen*, p. 348 *seq.*

[2] *I. e.*, by means of a bandage.

[3] Zak-Ḫi-Li = *siḫlu* (Meissner, No. 4658), as above, 1, 3. By the side of the determinative Šam (plant) the sign Še used for cereals occurs, indicating some plant belonging to the class from which a flour may be made. Is it perhaps "wild wheat?" This 6th line contains an alternative prescription for the same trouble as described in the preceding paragraph. This is indicated by the dividing line. Similarly, lines 7 and 8 represent a third prescription, and lines 9 to 17 a fourth remedy. This method of putting together as many remedies as possible for the same sickness is the characteristic feature of the Babylonian-Assyrian medical texts. In the complete series (*Cun. Texts*, xxiii, Pl. 23–50) a still larger number of remedies for each disease described is set forth. The writer of our tablet has extracted for his medical practice such of them as he considered most important or most efficacious.

[4] Ku = *ḳêmu*, "flour," the determinative to indicate a flour or powder followed by Še (cereal) and Sa-a, the combination of the three signs being read *laptu*, which, as Meissner (*Zeits. für Assyriologie*, VI, p. 295), pointed out, has an exact equivalent in the Syriac, Aramaic, and Arabic *laptâ* (Löw, *Aramäische Pflanzennamen*, p. 241 *seq.*), *i. e.*, *Brassica Rapa*.

[5] "Mountain" stone occurs in the neo-Babylonian list of stones, woods, and plants, No. 93084, obv. 2 (*Cun. Texts*, xiv, Pl. 16), also in the medical text KK61, etc., IV, 28 (Küchler, *Beiträge*, p. 60), where dust (*i. e.*, powder) of "mountain" stone appears as an ingredient of a concoction to be taken with oil and wine against a severe form of jaundice known as *ahhazu*.

[6] Rat, a sign of constant occurrence in medical texts, the phonetic reading of which has not yet been definitely determined, but which without question signifies "compound" in the sense of mixing drugs together. It is possible that it is to be read *kamâru* or *šamâru* on the basis of *Cun. Texts*, xxiii, Pl. 26, 3, and Pl. 50, 10 and 11, Rat (*mar*).

Strong(?) Ib-Ḫu plant[1] [in fat] of kanaktu herb,[2] Gam-ma-herb, juice of Si-Di plant,

10 [Salt product], tamarisk, seed of [maštakal] plant . . . powder of the twig of tamarisk, Eme-Sal salt;[3]

["Mountain" plant, Mint, zibû-plant[4] as much as thou needest], crush for the swollen (?) eyes (and) compound.

[1] Ḫu-Si ša Ib-Ḫu occurs without the determinative for plant, *Cun. Texts*, xxiii, Pl. 36, 51, and KK 71b, etc., II, 46 and IV, 22, in a prescription for some internal trouble (Küchler, *Beiträge*, p. 24 and 36) and with the determinative, as in our passage KK 61, etc., I, 24 (Küchler, *ibid.*, p. 44) for gall trouble. See above p. 370, note 2. The element Ḫu-Si is an exceedingly common one (see *e. g.*, the long list of equivalents, *Cun. Texts*, xii, Pl. 5), and a stone with this as an element occurs (*Cun. Texts*, xiv, Pl. 10, rev. 19). It may perhaps convey the force of something "large" or "strong," but it is idle to speculate as to the force of the combination with Ib-Ḫu until we come across the phonetic reading of the series of signs.

[2] Šim (or perhaps Rik), the sign for a "green" (?) plant, followed by Gig = to be read *kanaktu* (Meissner, No. 3562), of frequent occurrence in medical and ritual texts, generally accompanied by the sign for tree or wood, indicating, therefore, a shrub of some kind. The term *kanaktu* appears to be a generic rather than a specific one, which would account for the fact that it is the equivalent of various groups designating organic growths, used for medicinal purposes. See Meissner, Nos. 3543, 3575, 5965, 8131. The common value of Gig is *murṣu*, "sickness," so that our drug is described as one used for medicinal purposes. Meissner, *Supplement zu den Assyrischen Wörterbüchern*, p. 48[a], explains *kanaktu* as a sweet-smelling spice, but this is doubtful.

[3] The Babylonians and Assyrians knew of a variety of salts, as is apparent from such a list of salts as K 14053 (*Cun. Texts*, xiv, Pl. 31), in which our Eme-Sal salt (line 4) is included, as well as "mountain" salt (line 5), which suggests our "rock" salt," occurring in medical texts, *e. g.*, KK 191, etc., I, 31, KK 71b, etc., IV, 45 (Küchler, *Beiträge*, etc., p. 4, 38). An Amanu-salt occurring, *e. g.*, KK, 71b, etc., IV, 45 (Küchler, *ibid.*), KK 191, etc., 1, 10 and 31 (Küchler, p. 2 and 4), and elsewhere, is without question identical with our sal ammoniac. (See the author's paper on *The Medicine of the Babylonians and Assyrians*, in the *Proceedings of the Royal Society of Medicine*. For Eme-sal salt, see also *Cun. Texts*, xiv, Pl. 10, obv. 8).

[4] Tin-Tir Mi = *zibû* (Meissner, No. 7480). Tin-Tir is the usual compound ideograph having the value of *balâṭu*, "life," and with which, *e. g.*, the name of Babylon as the "place of life" is written (Meissner, Nos. 7484–7485). As a plant, with the addition of a sign having the force of a garden growth, it is to be read *kamûnu* (Meissner, No. 7481), which is the equivalent of our cumin (see Löw, *Aramäische Pflanzennamen*, p. 206),—another substance, therefore, used as a drug which can be traced back to a Babylonian origin. There are two varieties of "life plant," a garden growth, a white variety of

[His eyes wash with "horned" alkali[1] till the tears cease], (then) stop (?) and take (off) his bandage.

[Afterwards in a closed room boil kibtu][2] juice [into a Kan-Šar vessel],[3] (and) pour off (?).

[At the approach of a star, in the morning[4] annoint his head. Boil] juice of kibtu,

which, as Meissner, No. 7482, shows, is *kamûnu*, and a black variety, which is the one occurring in our text, and which is to be read *zibû*. We may, therefore, conclude that *zibû* is a dark-colored cumin as against *kamûnu*, the white or light colored variety. *Cf. Cun. Texts*, xiv, Pl. 19, 1–4.

[1] Eltek Si = *uḫûlu ḳarnânu*, according to IVR[2] Pl. 26, No. 7, 35 (*cf.* Meissner, No. 2975 and 2980). The identity of *uḫûlu* with Syriac and Aramaic *aḫlâ* (Löw, *Aramäische Pflanzennamen*, p. 42) leaves no doubt as to the equation of *uḫûlu* = alkali, which, despite its Arabic form, may be a corruption of our word. Several varieties of *aḫlâ* are known (Löw, *ibid.*), including a wild variety. Can the latter be meant by the addition of "horned?" At all events it is of interest to note, as again pointing to Babylonian-Assyrian influence, that the qualification "cornutus" (as Küchler, *Beiträge*, p. 100, points out) for plants occurs in Latin botanical nomenclature. Uḫûlu is found also with the determinative for stone, *e. g.*, *Cun. Texts*, Part XIV, Pl. 16, K 6003, 2. No less than three other readings for Eltek, with the determinative for "plant," are furnished in the list (*Cun. Texts*, Part xi, Pl. 45, col. I, 6–8), to wit, *mangu*, *ḳaḳulu* (cardamom) and *šamêṭu*. Are these perhaps all to be regarded as names of different varieties of *uḫûlu*, which would thus turn out to be a generic designation?

[2] (Giš) Še-Gig = *kibtu* (Meissner, No. 5492) is of frequent occurrence in medical and ritual texts as well as in commercial documents. It designates the "wood" or stalk of a cereal described as "sick," which, like Še-Šeš = *marru*, "bitter," *e. g.*, *Cun. Texts*, xxiii, Pl. 1, 2, appears to designate corn in a state of decay or that is unfit to eat. See the extensive lists of cereals in Zimmern's Text, No. 41–42, in his *Beiträge zur Kenntniss der Babylonischen Religion*, lines 26–27 (p. 148), which includes Še-Šeš and our Še-Gig.

[3] Kan-Šar with the determinative Duk = *karpatu*, "jug," a vessel of some kind. We have several long lists of vessels, *e. g.*, V. Rawlinson, Pl. 42, Nos. 1 and 2. Kan, with the determinative for "jug," as in our passage, occurs in medical texts, *e. g.*, KK 71b, etc., IV, 13, 16, 21 (Küchler, *Beiträge*, pp. 34–36), and is to be read *diḳâru* (Meissner, No. 2691), while Šar with this determinative has the reading *šuḫarratu*, "narrow" (IV Rawlinson, Pl. 26, No. 7, 33–34). The combination would, therefore, represent a vessel having the shape of a tube suitable for pouring off a medical potion that has been heated in it.

[4] *I. e.*, evening and morning. The phrase "at the approach of a star" for evening is of frequent occurrence in medical texts. Frequently the dawn of a star—Gula for the evening star, or the "goat" constellation—is added

15 [arrange (?)[1] the bandage of his head, attach] to his head a strip (?) [of colored wool].[2]

[Pour . . . . oil on his head, in a house] that is covered,[3] place him. [For three days] do this.

[When a man has a burning fever in his head, and] his hair falls out, and his head feels oppressed,[4]

[there is a swelling of the forehead] bind strong (?) Ib-Ḫu mixed with oil, around his head.

20 [Bind tight] and for 3 days do not remove.

[When ditto][5] . . . 10 šeḳels of powdered cypress,[6] 10 šeḳels of powdered su'adu,

as a further specification. However, the reference to the "goat" constellation is to be explained, the phrase is clearly another designation for "evening." See Küchler, *Beiträge*, p. 67 *seq.*, whose conclusions, however, are untenable.

[1] *tu-kar-ra-ar*, from *karâru*, for which see Jastrow, *Religion Babyloniens und Assyriens*, II, p. 333, note 10.

[2] Ga-Ṣu-Ak-A = *pušikku* (Meissner, No. 4378), with the determinative for "hairy" or "wool," designates some kind of prepared wool, probably of bright dye. The term occurs by the side of "dyed wool," *Cun. Texts*, xxiii, Pl. 18, 43, in a magic rite. The underlying idea is the same as in the case of the "scarlet thread" in the Pentateuchal ritual for the one to be cleansed of a sickness or relieved from a demon (Lev. 14, 4; Num. 19, 6).

[3] *bîtu ša ta-ra-nam ibasû*, *i. e.*, a house which has a *tarânu*. Since stress is laid (line 13) on placing the patient in a closed apartment so as to protect him against the further intrusion of demons, it is reasonable to suppose that the *tarânu* designates a house equally protected. I take our word as a variant form of *tirânu*, which signifies "protection" (Muss-Arnolt, *Assyrian Dictionary*, p. 1190). A *tarânu*-house is, therefore, one with a roof and with doors and windows tightly closed so as to exclude the demons. No doubt experience had also taught the Babylonians and Assyrians that keeping a patient who was suffering from a violent headache, accompanied by swollen eyes from which tears flowed, in a dark room and perfectly quiet with no one to disturb him was beneficial, but in primitive medicine the protection against demons occupies the first place and the hygienic or therapeutic idea is secondary. Hygiene and religious beliefs are thus frequently found to coincide, but by accident rather than by design.

[4] *i-šah-ḫu-uḫ* from *šaḫâḫu*, "bent down," an appropriate term to describe the heavy feeling in the head, accompanying headache and what we would call a cold in the head. The first part of the line is a conjectural restoration on the basis of line 1 of our text in connection with *Cun. Texts*, xxiii, Pl. 34, 22.

[5] Repetition sign to indicate the same symptoms as in line 18.

[6] Literally, 'flour of *šurman*," the sign Ku = *ḳêmu*, "flour," being regularly used to designate a drug in a crushed or powdered form.

[10 seḳels of powdered pine,[1] 10 seḳels of powdered] chicory,[2] 10 šeḳels of powdered cassia, 10 šeḳels of Tig-Gal[3] flour,

[10 šeḳels of Tig-Tur flour, 10 šeḳels] of date, 10 šeḳels of a thorn plant,

[10 šeḳels of good standing wine,[4] 10] šeḳels of powdered raddish,[5] mix together with wine, knead

25 [with white ḳurma, grind[6] and crush], $\frac{1}{3}$ of a Ḳa of it take for thy aching head.

Knead [with cassia], wrap around, attach and ditto.[7]

[Its ceremonial] dushû stone, šântu-stone, lapis lazuli, ḫulalû-stone, white stone

[1] (Šim) Li = *burâšu* (Meissner, No. 3535) with or without the determinative for tree, is the common term for a variety of the evergreen pine. *Cf.* Löw, *Aramäische Pflanzennamen*, p. 82, whereas *šurman* in the preceding line, with the determinative for tree represents the common cypress tree Löw, *ibid.*, p. 387 *seq.*).

[2] Gam-Gam = *kukru* (Meissner, No. 3555), which I have identified with Greek *kichora* and our English form "chicory." See my paper in the *Proceedings of the Royal Society of Medicine*, above referred to, p. 365. We would thus have another botanical term which through the influence of Babylonian-Assyrian Pharmacology made its way to the western world. The sign Li before Gam-Gam in *Cun. Texts* xxiii, Pl. 33, 10, is a scribal slip for Giš ("tree"), and which should evidently have been placed before Šim, the determinative for a growth of the "green" variety.

[3] Tig-Gal (large Tig), frequently occurring by the side of Tig-Tur (small Tig), two cereals, one having large grains and the other small, perhaps two varieties of barley. See Jastrow, *Religion Babyloniens und Assyrians*, II, p. 564, note 6; and 713, note 8, and Zimmern, *Beiträge*, Nos. 41–42, line 26, where Tig-Gal and Tig-Tur occur among a series of cereals.

[4] Bi U-Sa, for which our text has in line 40 a variant Bi-Us-Sa = *šikâru emêdu*, *i. e.*, wine that has been standing in jugs for some time, as against new wine. The qualification *damḳu*, "good," is apparently added to designate a wine that has improved with age.

[5] The sign used here enables us to supply the part missing in Meissner, No. 9706. *Puglu*, for which we have a perfect equivalent in the Aramaic *puglâ* (Löw, *Aramäische Pflanzennamen*, p. 309 *seq.*), is *Raphanus sativus*, or radish, described ideographically as "a life cereal." Is the form in *Cun. Texts*, xxiii, Pl. 33, 12; 41, 16; 42, 9; 43, 27; 44, 3; 50, 15, etc., to be corrected accordingly? See Meissner in *Zeits. für Assyriologie*, VI, p. 295.

[6] *Kurma* is no doubt to be identified with Talmudic *ḳurma* (see Jastrow, *Talmudic Dictionary*, p. 1343a), which in the combination *ḳuramê* (pl.), *de-agma*, designates a water plant the kernels of which can be eaten (Löw, *Aramäische Pflanzennamen*, p. 202). This is also found in Arabic under the form *ḳurm*.

[7] *i. e.*, for three days do not remove.

[Igi-Ḫa stone[1]] šubû stone, right šubû stone, left šubû stone,[2]
Kur-Nu-Dib [stone][3] Muš-[garru][4] stone, Aš-Min (?) stone, Muḫ-Aš-Min (?) stone—these 13 varieties[5]
30 [Thread on a cord of dyed wool] and tie together with wool, and the falling out of the hair will be restrained.
When a perspiration[6] stands out on a man's temple vein, accompanied by feverish headache,
His head is heavy, and (it affects) his throat,[7] [his head], his face (and) his forehead,[8]
(take) pine, margusu herb, bitter herb, and šunuḳu plant,
compound elît-urṣi stone[9] with oil and wine, let them rub his head, and the fever will pass away from his head.

[1] The two ideographs convey the idea of "fish-eye," a name given to the stone from its resemblance to the eye of a fish, and which suggests a designation like our "cat's eye" stone.

[2] Right and left in this combination designate two varieties of šubû stone that may have the force of "lucky" and "unlucky," or the names may be due to the direction of the grain in the stones.

[3] This stone, together with others occurring in this list, is found also in Zimmern, *Beiträge*, No. 11 (c), 28 and No. 74, 27, where, as in our text, a series of stones are to be strung together and tied around the neck—as a means of exorcising demons or as a purification rite.

[4] For Mušgarru stone, see Meissner, No. 5618.

[5] To discuss these 13 stones in detail would carry us too far afield. Suffice it to say that the list enumerates precious stones, having a special significance as amulets, just as the 12 stones in the breast-plate of the High Priest (Exodus 28, 17 to 20), those of the King of Tyre (Ezekiel 28, 13), and the 12 stones of the "Foundation" in Revelations 21, 19–20, are to be regarded as amulets—as protections against malicious demons. Two of the 13 stones in our list, viz., sântu = shoham, and šubû = shebô, occur among the 12 stones in the High Priest's breast-plate. In the use of stones as part of the medical treatment, the starting-point is the "amulet" point of view, with the medicinal qualities of the powder of certain hard organic substances as secondary.

[6] *zu-u-tu*, for which see Holma, *Namen der Körperteile im Assyrisch-Babylonischen*, p. 8, note 5.

[7] Zi = *napištu* in the sense of "throat" (Holma, *ibid.*, p. 40).

[8] Evidently a cold in the head, with high fever and inflammation of the throat.

[9] Zak-Ḫi-Li, which as a plant is to be read *siḫlu*, and designates a thorn plant; when preceded by the determinative for stone, together with Na = *êlu* (Brünnow Nr. 1584) is to be read *e-lit ur-ṣi* (Brünnow, No. 6512), and which occurs in a long list of stones (*Cun. Texts*, xiv, Pl. 16, K 240, etc., rev. 9). Such elaborate lists, of which we have several, *e. g.*, *Cun. Texts*, vi, Pl. 11,

35 [When a man's] head, his face, his eyes, his kîmu[1] and his lips are swollen,
his head, his face, his mouth, his hands, his kîmu pain him
his features (and) his tapkasu[2] are poisoned,[3] to cure him
(take) chicory, pine, Kur-Kur plant,[4] seed of Lid-Gab[5]
bits[6] (?) of murtim, twig of a thorn plant, cassia, turnip flour,
40 good standing wine, nikiptu-herb[7] Si-Di herb, crush and grind together,
knead with cassia, wrap around his head.
With its oil rub his head, attach (by means of a bandage) and for 7 days do not remove.

12; xiv, Pl. 14–17 (besides many unpublished fragments) were prepared, as were the lists of plants, as aids to the study of medicine and of the magic rites in connection with medicinal prescriptions. See further on in these lists my article on *The Medicine of the Babylonians and Assyrians* in the *Proceedings of the Royal Society of Medicine* for March, 1914.

[1] A part of the body not yet identified. See Holma, *ibid.*, p. 154. The word occurs in other passages (*e. g.*, *Cun. Texts*, xxiii, Pl. 46, 27, and Boissier, *Documents Assyriens relatifs aux Présages*, p. 26, 3; and 261, 26) in connection with "hands." In both these passages it is a part of the body which in the case of illness is hot, perhaps the chest or the upper part of the frame, somewhat like the Arabic *kîm*, which is used for the stature, though for the stature as a whole we have in Assyrian *ḳumtu* (Holma, *ibid.*, p. 2).

[2] An unidentified term, occurring here for the first time and designating, to judge from the context, another general description of the human body, perhaps the frame.

[3] *šim-ma-tu* for which see *Cun. Texts*, xxiii, Pl. 41, 9, when a man's forehead is swollen and he is poisoned, Pl. 46, col. iii, 27 (*u-šam-ma-ma-šu*), and Pl. 46, col. iii, 26, "his limbs are poisoned" (*i-šam-ma-mu-šu*); also Pl. 41, 15 and K7845 obv. 1 and 3; rev. 3 and 12 (Zeits. f. Assyr. xix, pp. 175 seq.

[4] "Plant of the mountains." There are quite a number of plants in the Babylonian-Assyrian plant lists containing the element Kur = mountain (*cf.* Meissner, Nos. 5364, 5368, 5370, 5373, 5376, 5378), an indication of the activity of the ancient pharmacologists in obtaining their drugs from remote places.

[5] Of frequent occurrence in lists and in medical texts. *Cf.* Meissner, No. 6653.

[6] Read *kit-li-e* on the basis of *Cun. Texts*, xxiii, Pl. 36, 50 instead of *kit-ni-e*, as has been hitherto done.

[7] A "Ninib salve," made presumably from the "Ninib herb" (*i. e.*, *nikiptu*, see below, p. 384, note 3), is frequently mentioned, *e. g.*, Zimmern, *Beiträge*, No. 26, obv. col. II, 7; also *Cun. Texts*, xiv, Pl. 23 (K 9283), 17, as a remedy against a disease *bennu*, etc.

When a man has a raging headache, his knees are heavy [and are swollen (?)],

he is in pain with heart spasms (?)[1] and [his knees ache],

. . . . . his palate is contracted,[2]

Reverse

. . . . . sweet reed, Kur-Kur plant . . . . . kibtu

. . . knead oil with cassia juice, flour . . . let him cook (?)

[on] a bright day[3] crush and grind, knead with cassia, attach (and he will recover).

[When a man] has an affection of the forehead . . . . cypress-wood, myrtle, sweet reed,

chicory old (?) myrtle (?), . . myrtle, palluku-herb,[4] boxwood, su'adu-herb, dirû (?) herb, strong (?[5]) [Ḫal herb, Ḫal herb, in] mixed[6] (sweet wine and) pour off;

[1] Gaz-Ša = *ḫîp libbi*, literally "crushing of the heart," occurring, *e. g.*, in historical texts (V. Rawlinson, Pl. 7, 55) in the sense of "broken-hearted."

[2] The first part of the line is obscure. The second part reading *ikkašu iktinirri* is a phrase of frequent occurrence in medical texts and in letters that has acquired the general sense of distress. A passage as in our text, almost parallel to KK 71b, etc., III, 55 (*ik-ka-šu ik-ta-nir-ru*, Küchler, *Beiträge*, p. 32), is valuable as furnishing the literal meaning of the phrase. The verbal form is derived from *karû*, "short," and then "distress" and the like. The passage in KK 71b, etc., shows that the "shortening" of the palate checks the flow of speech. The throat passages appear to be choked up, and the phrase is accordingly used to indicate a swollen condition of the back part of the mouth. "Shortness (or distress) of the palate" thus becomes the equivalent to our "shortness of breath." For further passages see Holma, *Namen der Körperteile*, etc., p. 25, and the references there given.

[3] Ud-da Bar-a = *ûmu namâru* (or *pišû*), which may convey the idea of preparing the medicinal remedy in the day time, just as we find on the other hand the instruction to take a plant that has been plucked before sunrise, *e. g.*, *Cun. Texts*, XIV, Pl. 23 (K259), 7 and KK 71b, etc., III, 25 (Küchler, *Beiträge*, p. 30). This line of our tablet is restored from *Cun. Texts*, xxiii, Pl. 40, 22.

[4] (Šim) Muk = *palluku* (Meissner, No. 3527).

[5] A-Kal = *ḫîlu* (Meissner No. 8883), occurring in association with various drugs (see Küchler, *Beiträge*, p. 115), designates a certain quality of the drug in question, and the ideographic combination suggests some such meaning as "strong."

[6] Read as *Cun. Texts*, xxiii, Pl. 39, 3. For Šur-ra = *mazû* see Meissner, No. 1879). The contrast to the 'mixed' wine is *ṭâbâtu dannu*, 'strong wine,' *e. g.*, *Cun. Texts*, xxiii, Pl. 50, 18.

turnip flour [spelt-flour[1] to be dissolved,[2] spread on leather], wrap around his head, attach and he will recover.

With Kur-Kur plant (and) ni[kiptu[3] in fire thou shalt fumigate] him.[4]

When . . . . . .

grind and crush; the [hair of an unmounted kid (and)] dyed wool thou shalt twist . . . stone, [. . . . . lapis lazuli] [brilliant Ka-Mi stone attach to his forehead,] and he will recover.

When the swelling of a man's [forehead has subsided, cook[5] old sesame], (and) chicory;

[pound] dirû (?) herb, [Ḫal herb with cassia.]

[Boil good] standing wine [barley-flour with wine, pour off and attach]

When a man's temple vein [is affected and pains him, take 10 Kisal[6] of kanaktu flour],

[10 Kisal of barley flour, 10 Kisal of chicory, 10 Kisal of cassia, 10 Kisal of powdered radish],

[10 Kisal of cooked sesame, mix together, knead with wine, and attach to his forehead.]

[When] upon a demon[7] seizing [a man, a swelling of his forehead ensues, to cure him (take) 10 šeḳels[8] of cedar wood],

[10 seḳels] of cypress wood [10 šeḳels of . . . herb, 10 šeḳels of Im-Di (?), 10 šeḳels of dupranu wood],

[1] Aš-am = *kunâšu* (Meissner, No. 4832) "spelt."

[2] Reading supplied on the basis of *Cun. Texts*, xxiii, Pl. 39, 3 and 9.

[3] *Cf. Cun. Texts*, xxiii, 40, 25; Pl. 42, 19 and 43, 6—the phonetic reading of the Ninib-herb (Brünnow, No. 5168).

[4] Fumigation of this kind is frequently referred to in medical texts, *e. g.*, *Cun. Texts*, xxiii, Pl. 26, 11, "with a fire of thorn wood thou shalt fumigate his head." *Cf.* K7845 obv. 3 (*Zeits. f. Assyriologie*, xix, p. 175).

[5] Gab = *epû* (Meissner, No. 2994).

[6] Kisal, a subdivision of the Shekel, as shown by K8976 (Bezold, *Catalogue of the Cuneiform Tablets in the Kouyunjik Collection*, p. 976)—a medical tablet with exorcising rites in which all three measures Mina, Shekel, and Kisal occur. The phonetic reading form of Kisal has not yet been determined.

[7] The completion of the imperfect sign to Gidim = *eṭimmu* (Meissner, No. 8689) is made certain by the comparison with line 29.

[8] Ki occurring in this and the following line, as also *Cun. Texts*, xxiii, Pl. 40, col. 1, 8 appears to be an error on the part of Thompson for 10 Ṭu, *i. e.*, 10 šeḳels. The characters on these medical tablets are frequently so small and so crowded that a slip of this kind is easily possible.

[10 šeḳels of boxwood, 10 šeḳels of palluku (?) herb, 10 šeḳels of Gamma, 10 šeḳels] of pine,

[10 šeḳels] of chicory, [10 šeḳels of good reed, (10 šekels of cassia), 10 šeḳels of dirû (?)-herb]

[10 šeḳels of powdered radish, 10 šeḳels of juice of . . . 10 šeḳels of good standing wine],

[10 šeḳels of kit]-li-e, [10 šeḳels of Lid-Gab, 10 šeḳels of Tig-Gal] 10 šeḳels of Tig-Tur,

[crush] and grind together [knead with wine (?) 10 šeḳels of turnip-flour],

spread on leather, boil (?) barley flour . . . (with cassia), pour off,

wrap around his head (and) attach to his forehead; (let them rub him) and he will recover.

* * pour off, (pound) in good wine let him drink and he will recover.

[When] a man's forehead [is affected], and the demon in a man's body cries out[1] [and does not quit him];

[despite] the bandage and salve[2] is not restrained;[3]

kill [a captured Kurkû bird[4]], squeeze its blood,

[1] The crying out of the demon is an interesting reflection of the current view that disease is due to the presence of a demon who has found his way into the body. A cure consists primarily in driving out the demon, and as I have shown in my paper in the *Proceedings of the Royal Society of Medicine* for March, 1914—several times referred to—the main aim of the medicinal remedies was originally to have an effect on the demon; to drive him out by foul smells and horrible mixtures or to coax him out by pleasant odors and redolent fumigation. One is reminded of the passages in the New Testament (Mark 1, 23 and Luke 4, 23) where demons who have seized hold of a man are represented as crying out. Such references show the persistency of the beliefs whereon Babylonian-Assyrian medicine rested.

[2] *nap-šal-tu* occurring, *e. g.*, in a physician's letter, Harper, *Assyrian and Babylonian Letters*, No. 391, rev. 18.

[3] *I. e.*, or where all remedies and magic rites fail.

[4] Kur-Gi with the sign Ḫu = "bird" to be read *kurkû* (Meissner, No. 5369) is of frequent occurrence in texts containing ceremonial directions. The name has all the appearance of an onomatapoetic word, imitating the sound emitted by the bird in question. It is tempting to identify the word with Talmudic *Kerukya*, generally regarded as the "crane" (Lewysohn, *Zoologie des Talmuds*, p. 169), though the crane is hardly the bird that one expects to be "caught" for a magic rite, particularly in view of IV Rawlinson, Pl. 26, No. 7, 47, where "the fat of the Kurkû bird which is brought out of the mountain" is to be added as an ingredient for a salve with which a man is to be rubbed. The Kurkû must, therefore, be (as the first element Kur "mountain" also shows) a mountain bird.

take [its mušeniktu, its fat and the skin] of its crop.

[Reduce in fire,] mix [cedar wood] with the blood, and [recite the incantation three times (?)].

When a man . . . . cypress wood, arzallu[1]-plant, tamarisk, Eme-Sal salt (?)

. . . . . husk[2] of ranunculus (?),[3] ½ (?) . . . . . .

ḫaršu wood,[4] . . . . . šalâlu reed[5] (?) "river-foam" plant,[6] musu stone,[7]

Fire-stone,[8] white (?) fire stone, black fire stone, white stone, Ninib stone, [and precious imbubu stone[9]],

[1] El which as a stone is to be read *arzallu* (Meissner, No. 8545) is perhaps to be read in the same way as a plant. It is of very frequent occurrence in medical texts.

[2] Še-Kak = *ḫabbûru* (Meissner, No. 5442), "husk." Correct Fossey *Zeits. f. Assyr.*, XIX, p. 180) and Frank (*ibid.*, xx, p. 431 *seq.*) accordingly.

[3] Nu-Luḫ-Ḫa = *nuḫurtu* (Meissner, No. 1168) of frequent occurrence in medical and magical texts which I venture to associate with Syriac *nûrta* (Ranunculus) (Löw, *Aramäische Pflanzennamen*, p. 258).

[4] Zi-Zi with the determinative for "grain" is to be read *ḫar-šu* (Meissner, No. 5413). Our passage shows that there was also a wood bearing this name.

[5] See *Cun. Texts*, xxiii, Pl. 41, 12. The sign Dun is certain, but Gi as a determinative is conjectural. The reading *ḳân šalâli* rests upon Meissner, No. 7492, though Ḫi appears to be wanting in our text.

[6] The reading Uḫ (An) Id = *rupuštu nâri* is certain, occurring *Cun. Texts*, xiv, Pl. 9, K4373, rev. 4–5 and Zimmern, *Beiträge*, No. 11, obv. col. ii, 9 and rev. col. iv, 4, as well as IV R², Pl. 4, col. iv, 60, by the side of *kibir nâri* 'river bank.' Both are designations of substances used medicinally. See also *Cun. Texts*, xxiii, Pl. 43, 9, and xvii, Pl. 24, 202.

[7] In K4023, col 1, 3 (unpublished), as well as *Cun. Texts*, xxiii, Pl. 47, 7, the reading is (Na) *mu-sa* (or *mu-ṣa*), but this is no doubt merely a variant for *mu-su*, just as *Cun. Texts*, xiv, Pl. 15, 19 and 20, we find a third spelling, *mu-ṣu*, of which a 'male' and 'female' variety are mentioned.

[8] The occurrence of a fire-stone or flint (also *Cun. Texts*, xxiii, Pl. 44, col. iii, 3; 47, 15) is exceedingly interesting. Jensen's objection to identifying our term with flint (in Küchler's *Beiträge*, p. 118) on the ground that the Babylonian-Assyrian physicians were unable to crush it into a powder has no force, and his proposed reading *mil'u* or *milḫu* is not justified by the passage in the syllabary (V Rawlinson, Pl. 31, No. 1, obv. 8) which he quotes.

[9] (Na) Ka Gi-Na Dib-ba supplied from K4023. Several stones with Ka Gi-Na as an element are known from the important list, *Cun. Texts*, vi, col. 1, 1–5. My reading is based upon Meissner, No. 428 and 8174. On the basis of our passage we may restore the beginning of *Cun. Texts*, xxiii, Pl. 44, col. iii, 4, accordingly.

mix together, pronounce over it the incantation, seven times (?) recite,
and his forehead, (his face) and his neck,
(and) his eyes let them rub with oil, and the demon will be driven out.[1]
Incantation "The evil finger of mankind,"[2]
over (him) [thou shalt recite.]
Tablet of Nabû-zêr-kitti-lîšir son of Mardî,
son of Aplâ the high priest (?) (of the king (?).[3])

The tablet, as will be seen, deals with a variety of diseases having their seat in the head, or which affect primarily the head. In a general survey we may subdivide the two sides of the tablet as follows:

1. A cold in the head, accompanied by fever with headache, watering of eyes, clouded vision, severe inflammation, and sharp pains. (Obverse lines 1–3.) For this trouble five kinds of poultices to be applied to the head are prescribed—the series of prescriptions being indicated by division lines (*a*) obv. lines 3–5, (*b*) obv. 6, (*c*) obv. 7, (*d*) obv. 8, (*e*) obv. 9–17.

2. Headache with fever, falling out of hair, and oppression of the head and swollen (or inflamed) forehead (obv. 18–19), with two prescriptions—(*a*) lines 19–20 and (*b*) lines 21–26—both poultices to be applied to the head and (*c*) a ceremonial or magic

[1] Lines 35 to 39 represent a portion of col. 1 of Tablet III of the Series: "When a man has a fever," as is shown by a comparison with K4023—the unpublished third tablet which I had the opportunity of studying and copying in part during a brief sojourn in London in October, 1913. This magnificent tablet referred to in the introduction to *Cun. Texts*, xxiii, p. 5, will, it is to be hoped, be included by R. C. Thompson in his forthcoming edition of some 500 medical texts of the Kouyunjik collection. K7642 is a duplicate fragment of the same tablet.

[2] This line representing the beginning of an incantation is found *Cun. Texts*, xxiii, Pl. 49, col. I, 7 (of also l. 5), with a slight variation. It represents the beginning of an incantation in Sumerian, followed by a transliteration into Akkadian, *i. e.*, the Semitic speech of Babylonia and Assyria. This method of giving in one-half of the line the Sumerian form of the incantation and in the other half the Semitic translation is followed, *Cun. Texts*, xxiii, Pl. 49, 7–12, and shows that this edition of the text was prepared for school purposes to aid the young students in intepreting the difficult incantations.

[3] The colophon has been discussed above, p. 367.

rite (lines 27–30) in connection with the cure, and which consisted of stringing 13 stones of a magic character on a bright-colored strip of wool and, presumably, tying them around the head.

3. Perspiration with fever and headache, heaviness of the head, pains in the throat, eyes, and forehead (obv. lines 31–32), with a salve or liniment prescribed as a remedy to be rubbed on the head (lines 33–34).

4. Swelling of the head, face, eyes, lips, etc., with accompanying pains extending to the entire body and symptoms of a poisoned system (obv. 35–36), for which again a salve or liniment to be rubbed on the head, and attached also as a poultice, is prescribed (obv. 37–42).

5. Swelling of the head, heaviness of the knees, with pains in various parts of the body (obv. lines 43–45), with a poultice as a remedy (rev. lines 1–3).

6. Symptoms rather vaguely described as an affection of the forehead, assuming perhaps the same details as in the preceding section (rev. line 4), with two remedies, (*a*) a poultice spread on a leather and attached to the head (rev. 4–7), and (*b*) fumigating the head (rev. 8).

7. Symptoms not preserved (rev. 9), but no doubt identical with those in the preceding section (or in the preceding two sections) with a magic rite, consisting of various kinds of wool twisted together and magic stones attached, and the whole to be wrapped around the head (rev. 9–12).

8. Swelling on the forehead subsiding (rev. 13), with a hot application prescribed at this stage (rev. 13–15).

9. Pains in the forehead (rev. 16), with a poultice prescribed as a remedy (rev. 16–18).

10. Demon seizing hold of a man with (*a*) an elaborate poultice as a remedy (rev. 19–27) and (*b*) a simpler application (rev. 28).

11. In the case of similar symptoms persisting despite remedies applied, the addition of an ingredient to the poultice or application (rev. 29–30).

12. Magic rite consisting of mixing parts of a slaughtered bird with the blood, burnt to a crisp and mixed with cedar wood (rev. 31–33).

13. Symptoms not preserved with a salve or liniment to be wrapped on the head as a means of driving off the demon (rev. lines 34–39).

14. Incantation formula (rev. 40–41).

The tablet furnishes us with a good general survey of the character which Babylonian-Assyrian medicine retained throughout all Assyrian periods. Observation of symptoms was purely empirical, and was never developed into a system that might even lay claim to the title of a systematic differentiation in diagnosis. A naive attempt at an unscientific classification was made as in the series of which our tablet represents an extract, but the attempt was based on taking a prominent symptom as a starting-point, and grouping around it all other symptoms which included the main one—in this instance, a pain or inflammation or fever affecting the head. It is well known that headaches were always regarded in ancient medicine as fraught with great significance. The Talmud[1] has a saying to the effect that there is no ache so unpleasant as a headache. No doubt the frequency of headaches was the primary reason for the prominence accorded to the symptom in ancient medicine, and since the common theory of disease was that of demoniac possession, the conclusion, though naive, was natural that the demon had his seat in the head whenever the head was affected. We thus have in our tablet no less than twelve[2] bodily troubles described by their symptoms, in all of which the assumption is that the seat of the demon causing the symptom is in the head—merely because headache is a symptom in all these cases. In the complete series, the number of these "head" diseases is still larger. If one bears in mind how common the symptom of a pain in the head is in a large number of bodily ills, it will be seen how hopeless the outlook was to advance to any scientific differentiation of diseases with a headache as a starting-point. The persistence of the association of disease with the presence of a demon in the body was a further stumbling block, checking effectively all further advance in the

[1] Talmud Babli Shabbath 18[a].

[2] Excluding the magical rite and incantation.

direction of a scientific diagnosis. The headache was there, which meant that the demon was in the head, and from the head as a starting-point, he could extend the scope of his tortures to other parts of the body.

It would take me too far afield and also carry me beyond the borders of my limited lay knowledge of medicine to endeavor to determine the various diseases included in our tablet under "head" troubles. The symptoms in most cases point to a variety of "colds" settling in the head or throat, or extending to the chest and thence to the entire body, but including also neuralgia and the equivalent to our "grippe." It is interesting to note the frequent reference to swellings in various parts of the face and particularly in the upper part of the head, which seems to refer to the veins standing out prominently, as is the case in certain forms of neuralgic headache.

Coming to the remedies, the uniformity of prescribing applications of salves or ointments or liniments, hot or cold, for the head, or rubbing the head with a combination of medicinal substances, or allowing the fumes of drugs to play around the head, rests on the diagnosis that in all the cases described in the tablet the demon as the cause of the disease is in the head and must be driven out. Hence the attention of the physician is concentrated on the single part of the body supposed to be the seat of the disease. The purpose of the treatment is in all cases the same, to relieve the patient by freeing him from the clutches of the demon. The drugs in their various combinations made into salves to be rubbed on the head, or to be placed as salves or liniments on a cloth or piece of leather attached by means of a bandage to the head, are prescribed as a means of either driving the disease out of the patient's head by virtue of their strength, or of coaxing him out by their pleasant odors. This is the underlying principle of Babylonian-Assyrian therapeutics, which is adhered to throughout all periods. That the drugs had also a direct beneficial effect in affording relief by reducing the inflammation and by soothing the irritated nerves, or in some other way acting on the symptoms was, of course, known to the Babylonian-

Assyrian physicians who prescribed drugs which experience had shown to be effective, but the belief persisted that the reason for the relief was because the patient had been freed from the grasp of the demon seated in some part of the body. A cure was regarded as equivalent to driving or coaxing the demon away from the infected part of the body, or from that part which was supposed to be the seat of the demon which meant the seat of the disease. The two points of view, (1) the beneficial action of drugs on the basis of experience, and (2) the release from the demon by means of certain drugs represent an equation in which the one point of view is the exact equivalent of the other.

The greatest difficulty still besetting the study of Babylonian-Assyrian medicine is the identification of the many drugs occuring in medical texts and in lists of plants, stones, and woods[1] prepared by the physicians as aids to the study of medicine. On the basis of these texts and lists the Babylonian-Assyrian Pharmacopœia compares favorably in the number of drugs obtained from plants, herbs, stones, shrubs, and trees with a modern compilation. While, as I have pointed out elsewhere,[2] other forms of medical treatment were introduced such as massage, diet, and we even encounter the precursor of the modern rest cure, yet drugs in one form or the other, as a liquid or solid, as a salve or liniment, as a hot or cold application, as an enema—very largely prescribed in indigestion and other stomach and bowel troubles—formed the staple practice of the physicians. Drugs, drugs everywhere!

The difficulties, however, encountered in identifying the plants, stones, shrubs, and trees occurring in the medical texts and study lists are considerable, and in the case of many the outlook for a satisfactory explanation seems hopeless. The names in many cases are written ideographically, *i. e.*, in their Sumerian form, which means that each sign represents a word.

[1] In the article on "The Medicine of the Babylonians and Assyrians," in the *Proceedings of the Royal Society of Medicine* for March, 1914, I have given illustrations of these aids in the study of Babylonian-Assyrian medicine and summarized the results to be obtained thereform.

[2] See preceding note.

The names thus obtained are frequently quite fanciful[1]—somewhat like our popular names of flowers or plants—or of so general a character as to be of no value in establishing an identification. Fortunately the lists referred to furnish, in the great majority of the drugs in common use, the phonetic reading of the signs with which they are written, which means that we have them in the form by which they were known among the Semitic population of the country. Syriac and Arabic medicinal and botanical literature, as well as the great compilation of Rabbinical Judaism known as the Talmud, which is full of medical and plant lore, come to our aid in helping us to identify a considerable number of plants and trees, the leaves, flowers, pulp, juice, or rind of which were converted into drugs. In this way[2] we now identify *nînû* as "mint," *kasû* as "cassia," *puglu* as "raddish," *kamûnu* as "cummin," *lišan kalbi* as "cynoglosson," *laptu* as "turnip," *kukru* as "chicory," *šûmu* as "onion," *karâšu* as "leek," *ḫaba-ṣillatu* as "onion," *gingiru* as "rocket," *ḫis* as "lettuce," *šibêtu*

[1] *E. g.*, *lišân kalbi*, "dog's tongue," which fortunately, because it made its way to the Greeks and thence to Western Europe as "cynoglosson," can be identified. *Cf.* also Löw, *Aramäische Pflanzennamen*, p. 243, for the same term in Syriac and Arabic medicine. *Cf. Cun. Texts*, XIV, Pl. 20, rev. 13–19. Among other fanciful designations the following may be mentioned "river-brink" (*Cun. Texts*, xiv, Pl. 18, rev. 7), "star of the sea" (*ibid.*, 10-11 and Pl. 25, obv. 5–6), "vomiting" plant (Pl. 19, 12a), "field foundation" (Pl. 24, obv. 12 and Pl. 37, K4417, 7), "heart plant" (Pl. 25, obv. 28), "ear plant" (line 27), "plant with one head" (rev. 7), "foot plant" (Pl. 27 K4621, 8 and 20), "vulva of the she-ass" (Pl. 27, K4162, obv. 11), "plant of tears" (Pl. 18, rev. 3; 22, col. V, 1), "white life-herb" which through the phonetic reading (Meissner, No. 7482) can be identified with a cumin variety, while the black variety to be read *zibû* is perhaps also a variety of cumin. *Cf. Cun. Texts*, xiv, Pl. 41, K8791, 2–4; "fox-vine" (Pl. 36, K4187, 5 and 7), etc.

[2] See Meissner, *Babylonische Pflanzennamen* (*Zeits. f. Assyr.*, vi, pp. 289–298); Küchler's commentary to his texts in his *Beiträge zur Kenntniss der Babylonisch-Assyrischen Medizin* and Holma, *Kleine Beiträge zum Assyrischen Lexikon*, pp. 57–97. A valuable contribution to the subject was also made by Ernst Herzfeld in his article "*Herbaraufnahme aus Ḳal'at Šerḳaṭ-Assur*" (*Orient. Litt.-Zeitung, Beihefte, II*), giving modern Arabic names for 181 plants which in quite a number of cases help us to identify the Babylonian-Assyrian botanical nomenclature. Budge's recent work, *The Syriac Book of Medicine* (Oxford, 1913), is also of great value for the study of Babylonian-Assyrian pharmacology.

as "dill," *ḳaḳullu* as "cardamom," *kusibirru* as "coriander," *zambûru* as "thyme," *silḳu* as "beet," *kiṣṣû* as "cucumber," *piḳḳûti* as "coloquinth," *ammaluga* as "myrobalan," *buṣinnu* as "verbascum," *girgiššu* as "arbutus unedo," *zapru* as "straw flower," *zuriratu* as "portulaca," *ḫambaṣûṣu* as "star of Bethlehem," *lardu* as "nard," *nuḫurtu* as "ranunculus," *sagilatu* as "jasmine," *zûpu* as "hyssop," *sindû* as "holm oak," *sappandu* as "mustard," *šûšû* as "liquorice," with a synonym *ṣilbânu*, *šimeššâlu* as "boxtree," *šišnu* as "juncus," *burâšu* as "pine," *bînu* as "tamarisk," *ḫaldappânu* as "oleander" (?), *urbatu* as "willow" (of which there are several other names to designate varieties), *erinnu* as "cedar," etc.

Extensive as such a list is already—and the enumeration does not claim to be exhaustive—yet the number of unidentified plants, flowers, shrubs, and trees which occur more or less frequently in the medical texts is still very large; too large to enable us at present to obtain a satisfactory survey of the medicinal remedies used by the Babylonian-Assyrian physicians. Our knowledge of the stones occurring in medical texts and in study lists is even more defective. Barely six of the many dozens of stone names have been definitely identified, though there is every reason to believe that the efforts of scholars now being directed to the study of the plant and stone nomenclature of Babylonia and Assyria will, in the course of the next years, yield important results. In the medicinal use of stones[1] we have again the same two points of view as in the use of plants, flowers, shrubs, and trees, the belief in the protective quality of stones as "amulets" to shield one from the approach or attack of demons and the therapeutic value of the powders which they yield when crushed. To be sure, the determinative for "stone," as I have shown elsewhere,[2] is used in a very wide sense to

[1] See on this subject the excellent summary of stones in medicine on pp. 367–391 of G. F. Kunz's recent work *The Curious Lore of Precious Stones* (Philadelphia, 1913), which is in general a mine of valuable information on the use of stones in antiquity and in modern times.

[2] In the article above p. 391, note 1, referred to.

include all hard substances which we would class today as "inorganic," just as the sign for plant is used to cover all growths that we would place under "inorganic." The range of substances introduced by the sign "Na" = *abnu*, "stone," is thus very large, and this extended use must be borne in mind in further investigations of the subject.

In general, however, it may be said that the Babylonians and Assyrians utilized every substance that nature produced in their medical treatment, and the lists also show that they went outside of the borders of their country[1] to obtain drugs which experience had shown to be of value in fighting the demons of disease. The medicine of Babylonia and Assyria thus became a factor in promoting the commercial and political extension of Babylonia and particularly of Assyria to other lands of antiquity—to Elam on the east and northeast, to Palestine and Syria on the west and northwest, and even to Asia Minor on the one hand, and to Egypt on the other. The fight against the demons was the touch of nature that made all the ancient world akin. The belief in demons as the cause and seat of all physical suffering was universal, and the unceasing struggle against them represented a common cause. Hence the spread of Babylonian-Assyrian medicine even to Greek lands with the advancing influence of its civilization, while in return the remedies found effective elsewhere made their way into the valley of the Euphrates and Tigris. In the course of this article I have pointed out substances like cassia, chicory, ammonia, cummin, and cynoglosson occurring in the medical treatises of Greek physicians, that can be directly traced to a Babylonian-Assyrian source. The list can be still further extended, and further researches will in all probabilities show that Egyptian drugs made their way into the medical

[1] *E. g., Cun. Texts,* xiv, Pl. 21, col. V, 19–21, three varieties of a thorny plant are enumerated: one from Šubari—an old name for Assyria; another from Canaan, and the third from Meluḫḫa, which is probably to be sought on the eastern coast of Africa. Šubari is again mentioned as the origin of a plant by the side of another from the "Cassite" land (*Cun. Texts,* xiv, Pl. 31) K4586, 6–7. *Cf.* also *Cun. Texts,* xiv, Pl. 39 [K10126, etc.] 4 and 10.

texts and into the study lists of Babylonian-Assyrian archives, while in return Egyptian medicine, occupying on the whole and particularly in the older periods of Egyptian history a far higher rank and betraying a more scientific spirit than that of Babylonia and Assyria, will be found to have obtained some of the drugs used from Babylonia and Assyria, as well as from Palestine and Syria.

ERRATA IN THE AUTOGRAPHED COPY OF THE TEXT

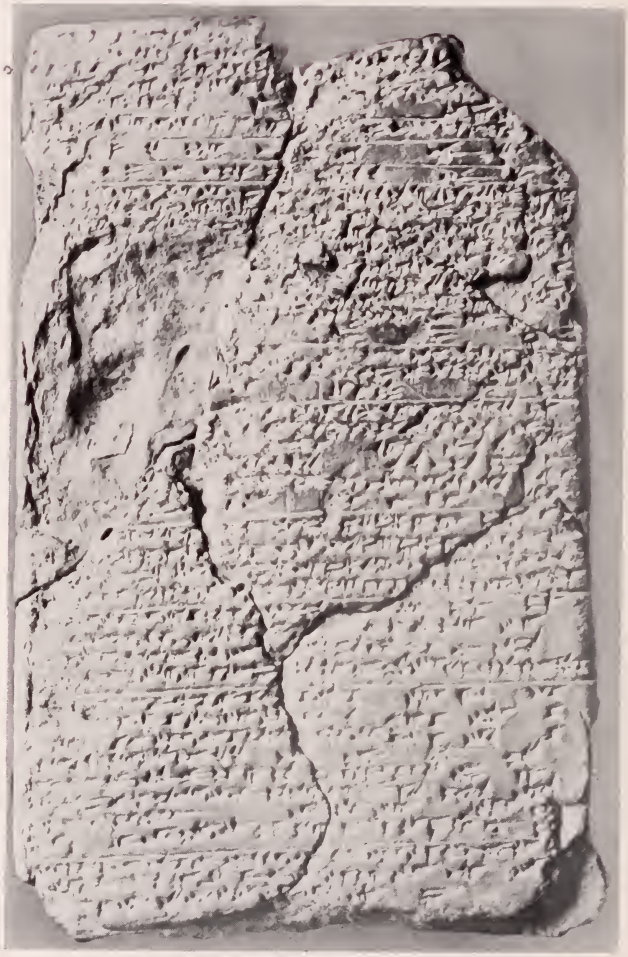
Obv. 22. 10 Ṭu Ku (Šim) Li = 10 šeḳels of powdered cypress—omitted by accident.

Obv. 30. A superfluous *da*.

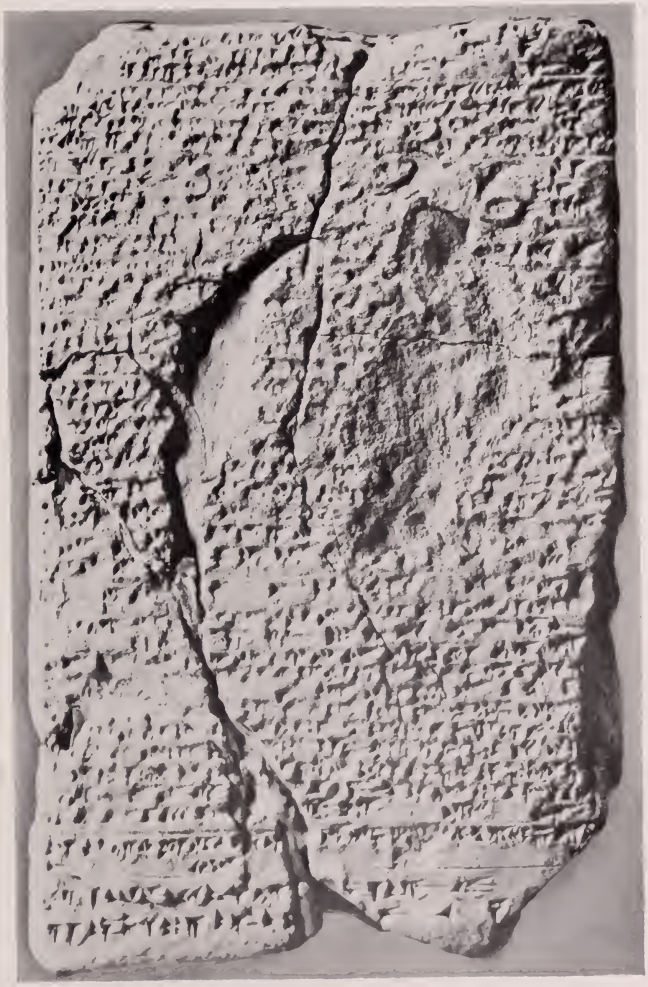
Rev. 12. Read *ut* at the end of the line instead of *ki*.

Rev. 15. Add Ku Ḳum = *ḳêm ḫašâli* after *damḳu* in accord with *Cun. Texts*, xxiii, Pl. 41, col. ii, 3.

Rev. 23. According to *Cun. Texts*, xxiii, Pl. 45, 9, the reading to be supplied is Kil (or Rim) followed by the sign for *puglu*, "raddish." However, Kil may be a slip for Ku = *ḳêmu*, "flour," although we have Kil with perhaps our sign (or Bir (?)) in the prescription attached to the 'Legend of the Tooth-worm,' *Cun. Texts*, xvii, Pl. 50, rev. 25.



OBVERSE



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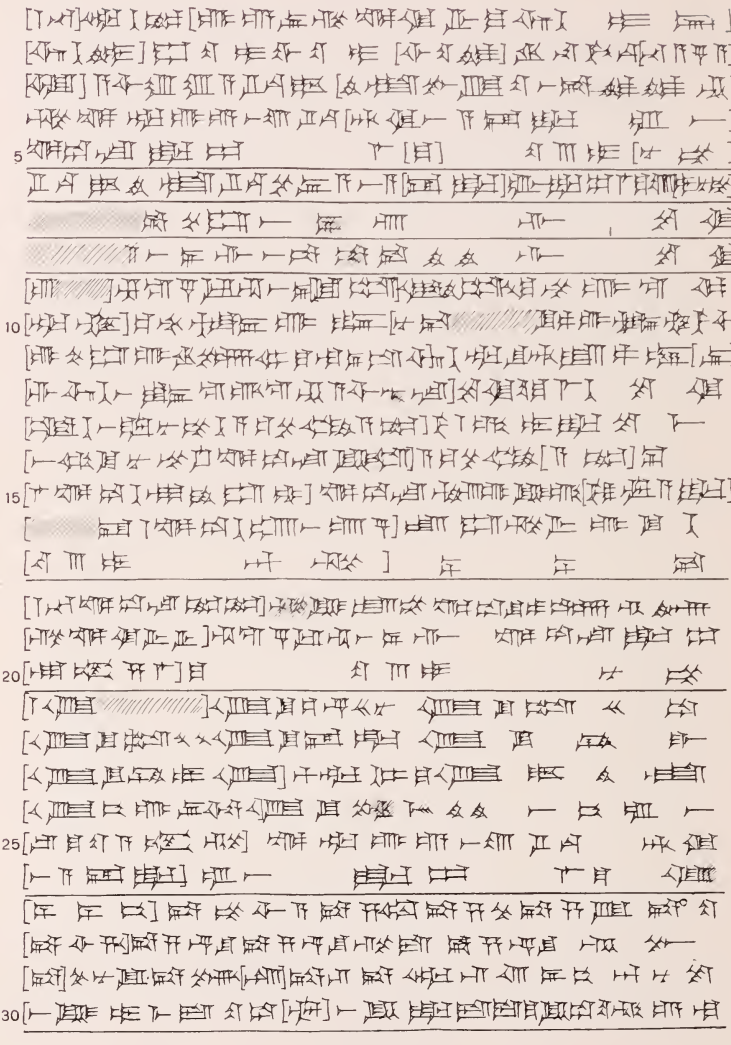

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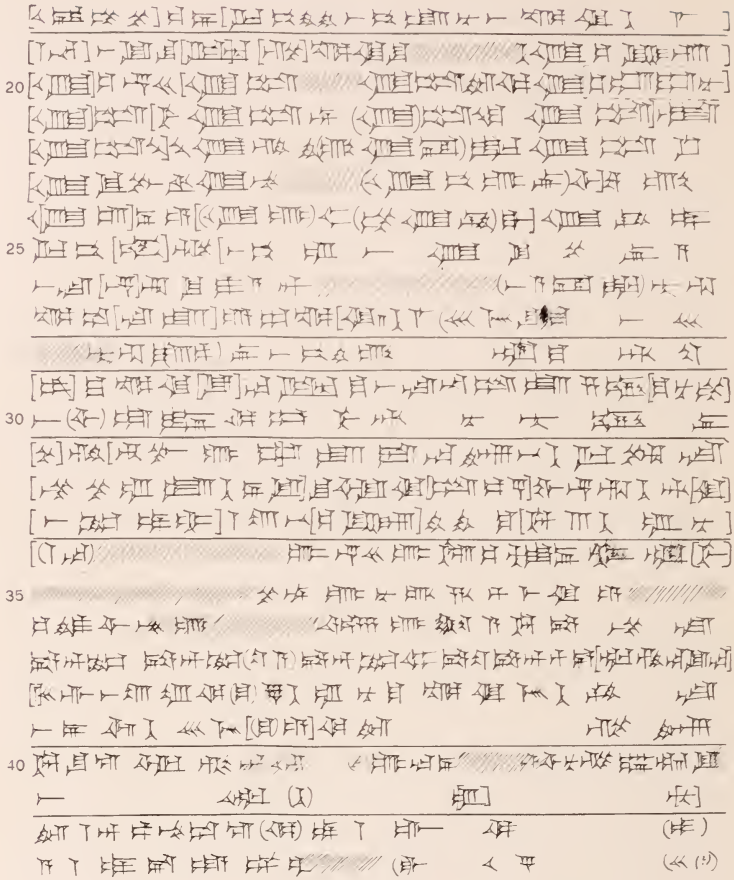

PROCEEDINGS

OF THE

SECTION ON OPHTHALMOLOGY

JANUARY TO DECEMBER, 1913

JANUARY 16

Cerebrospinal Syphilis with Ocular Palsies

Dr. Posey showed a case of cerebrospinal syphilis with complete bilateral ophthalmoplegia interna and almost complete bilateral ophthalmoplegia externa. There had been marked deformity in the position of the eyes and head occasioned by the tilting of the left eye up and in, in consequence of an overaction of the inferior oblique and superior rectus muscles of that side. The deformity had been largely overcome by a complete division of the tendon of the inferior oblique and by a guarded tenotomy of the superior rectus muscles.

Exhibition of a Case of Vernal Conjunctivitis

Dr. Posey showed also a case of vernal conjunctivitis of an unusual type in which the pale pinkish, waxy excrescences in the conjunctiva had persisted for several years during the cold weather, and on account of their more or less rounded yellowish

appearance, simulated trachoma. Dr. Posey considered this type extremely rare, having met with it but three or four times in his entire practice. In several other similar cases he had been compelled to shave off the granulations even with the conjunctiva by means of a sharp knife, to prevent mechanical injury to the cornea. He had found continuous massage of the conjunctiva with lanolin or with a salve of yellow oxide of mercury (4 per cent.) the best means of preventing a recurrence. Dr. Posey referred to the preponderance of cases of vernal conjunctivitis in low-lying districts, but said that he had observed several cases which had originated at an altitude of over 10,000 feet.

An Electrical Perimeter

Dr. George S. Crampton exhibited an electrically illuminated modification of the McHardy perimeter devised by Dr. Nelson M. Black, of Milwaukee, who succeeded in obtaining pigments in Europe which, on spectroscopic analysis, were found to be pure enough for practical purposes. The red and green were quite pure, while the blue showed a faint green border, and the yellow gave a varied spectrum with yellow predominating.

The question of light value still seems to offer considerable difficulty, and some means of standardizing the amount of light used in all electric perimeters is necessary in order that we can compare fields taken by different observers. A small photometer would seem to be indispensable in the adjustment of the illuminant so that it will give a field equal to that of average daylight. The minimum degree of light obtainable with the present model gives a field somewhat larger than that obtained with daylight. The instrument is very convenient in taking fields where the vision is much reduced.

The point of fixation and moving light are controlled by diaphragms. The translucent pigments, in the form of isinglass, are sealed between plates of glass, and are illuminated by tungsten lamps supplied by a dry battery with rheostat. The perimeter is manufactured by the De Zeng Standard Co.

Dr. S. Lewis Ziegler stated that the perimeter just shown was practically a duplicate of Michel's perimeter. Recently he had brought from abroad some of the colors used on this perimeter, and he was under the impression that the colors were made in a similar way to those used on the instrument exhibited by Dr. Crampton, that is, thin pieces of colored isinglass were placed between two pieces of glass. He had seen Michel's instrument used in the Vossius Clinic at Giessen, but he thought there was one objection to the instrument in that the fields so obtained were much larger than those secured by daylight.

Dr. Zentmayer said that there was one advantage that occurred to him in having the colors illuminated by transmitted light, and that was that they would have equal illumination in all meridians and in all parts of the meridian. With reflected light the body of the patient is more or less interposed between the source of light and the perimetric arc, especially in the lower field. Again, at some points on the arc the light may so strike the object that there is total reflection and the color temporarily passes from view as though there was a scotoma. An objection to it is that it will be necessary to have new standards for the normal fields, and these will not be comparable with fields taken with reflected light. The electric appliance still further complicates the mechanism of an instrument already too prone to get out of order.

Dr. Sweet stated that he had experimented several years ago with an electric light perimeter, but found the results unsatisfactory because of the impossibility of securing glass of perfectly true color values, and also owing to the difficulty of securing uniform illumination and eliminating the glare of the light. Glass was secured from the makers of the Michel electric light perimeter in Berlin, but it proved only partly successful. Dr. Sweet found the same increased dimensions of the field with the electric light as noted by Dr. Crampton, and believed that, before accurate fields could be secured, some means must be found to regulate and record the intensity of the illumination at each examination.

An Electric Ophthalmoscope with Translucent Color Test

Dr. George S. Crampton exhibited a modification of the electric Loring ophthalmoscope, in which variously colored disks can be revolved to position in front of the electric lamp and their exposed areas controlled by diaphragms. This instrument was devised by the De Zeng Standard Co.

Two Cases of Developmental Alexia

Dr. Burton Chance reported two cases of "developmental alexia" (word-blindness): one in a young man, aged eighteen years, and the other in a lad, aged ten years. The man had attained to a remarkable degree of general learning, and yet he was unable to read printed words, but could readily decipher figures, even in complex combinations. In his attempts at words he first spelled out the letters, quite readily arranging them in their syllables. He was unable to read any words, even those of only three letters, without first vocally spelling them, but after spelling out a word when the same word was written and shown to him he became confused and could not pronounce it. His name and home and school addresses were written, evidently automatically; even these when written by another hand and shown to him he could not read.

In the younger case, letters as well as words were badly perceived. In an attempt to write at dictation the smallest words had to be spelled letter by letter vocally. Oral repetitions could be spelled correctly. Each showed no evidences of defects in color perception nor were there any symptoms indicating defects in the visual fields.

Pseudoglioma with Microscopic Report

Dr. Krauss reported the microscopic findings in the case of a growth in the vitreous presented before the Fellows last spring.

The eye was removed on account of its close resemblance to a true glioma of the retina occurring in a child and the sudden rise in tension. The macroscopic appearance of the section suggested a tumor in the region of the ora serrata. Microscopically the cornea, sclera, iris, ciliary body, and chorioid were practically normal. The retina was detached, except at the nerve, and approximated the chorioid and sclera at the ora serrata. The growth consisted of a small cell infiltration, with a tendency to organize, probably the result of subretinal hemorrhage. A large recent subretinal hemorrhage appeared on the opposite side. The remains of the vitreous were normal.

Dr. Krauss called attention to the marked similarity existing in the reported cases of pseudoglioma, enucleated on account of possible glioma, in all of which the chorioid was unaffected. It would seem that these cases were not in anyway due to suppurative chorioiditis as severe inflammatory symptoms were absent. They form a distinct type to which the name of pseudoglioma should be exclusively applied.

Diabetic Iritis and Retinitis

Dr. Zentmayer presented a patient having several of the ocular complications of diabetes. The patient was a woman, aged sixty years. She had been under treatment for diabetes for four years. Until one year ago she was on a restricted diet, but as her general condition seemed much improved, she returned to a full diet. Sight began to fail about two years ago, at first slowly, but very rapidly within the last two months. V. O. D. = L. P.; O. S. = counting fingers at 1 m. In O. D. there was an apparently mature cataract with sequelæ of iritis. In O. S. there were numerous posterior synechiæ. There was an irregular curved belt of confluent areas of yellowish-white plaques extending from near the temporal margin of the disk outward a short distance along the course of the inferior and superior temporal vessels. There were a few scattered hemorrhages interspersed within this vicinity.

Dr. Zentmayer spoke of the non-conformity in the descriptions of diabetic retinitis given in text-books and in the writings of various authors. The existence of a distinctive type of retinitis due to diabetes was even questioned by some. From his own limited experience he had come to the conclusion that the lesions in the retina often presented a glistening appearance, and were rather more delicate than the exudative or degenerative areas seen in albuminuric retinitis. The present case showed changes resembling the early stage of circinate retinitis; however, Fuchs has also seen this type in diabetes.

Dr. Holloway stated that it was always rather difficult to state offhand the number of cases of a certain condition one had seen, but he felt safe in saying that he had seen a number of cases of diabetic retinitis at the University Hospital, and in his experience the whitish lesions were usually diffusely scattered about the posterior pole in association with hemorrhages. A year or so ago he had under observation a case of uveitis associated with diabetes, and at the present time has under observation a diabetic patient who some months ago developed paralysis of one of the ocular muscles. He now has a small hemorrhage in one eye, but there are no white exudative lesions; he has moderate evidences of a sclerosis of the retinal vessels.

Dr. G. Oram Ring asked Dr. Zentmayer how long the case had been under observation, and how many urinary analyses were made during that period. Dr. Ring called attention to the fact that the retinal lesion present which had been diagnosed as diabetic in origin, might be accounted for upon the supposition that nephritis was present, but that during the brief period of observation might have been quiescent.

The kidney lesions which bear a direct etiological relation to the retinal disease may involve only portions of and not the entire organ, and the area of involvement can be at times sufficiently quiet not to show the chemical and microscopic signs of active nephritis.

The clinical symptoms of an associated nephritis with diabetes

(other than the urinary findings) so frequently overlap that only repeated analyses will elucidate the problem involved.

It would be of interest in such a case to make a study of the chlorine and nitrogen output in relation to intake.

Dr. Krauss stated that he had seen a number of cases of diabetic retinitis which seemed entirely different from albuminuric retinitis. The lesion consisted of aggregations of roundish spots of glistening white, scattered about the fundus, especially about the disk. There was a marked absence of striate formation about the macula.

Dr. Langdon stated that he was rather surprised to hear Dr. Zentmayer say that some authorities deny the occurrence of a diabetic retinitis. Did they mean that there were no evidences of inflammation due to diabetes or simply that there is no actual type which may be ascribed to the disease? Already there have been several cases mentioned in this discussion, and without searching my memory carefully, I can think of three cases I have seen, which were believed to be a part of a diabetic condition, at least, no physical signs of any other ailment could be found. Are the aforementioned authorities mistaken, or are we at fault in our belief?

Dr. Hansell stated that the question of extraction of cataract in diabetic patients has been freely discussed, and it is generally agreed that the operation may be safely performed when the percentage of sugar is less than 2 per cent., and the patient is in a fair condition. As an illustration of the wisdom of this dictum, he cited a case recently under his care in the Jefferson Hospital. A woman less than sixty years of age had double mature cataract, without apparent complication. She had long been a victim of diabetes. The left lens was removed, and in four weeks the right lens. Both eyes healed normally and vision with glasses was $\frac{20}{30}$. She had 0.8 per cent. of sugar.

Dr. Zentmayer, in replying to Dr. Hansell, said that he recalled a case of cataract in a diabetic operated upon by Dr. Norris, in which the eye became blind from relapsing hemorrhages into the anterior chamber and a severe iritis. He also recalled seeing

considerable iritis and recurring hemorrhages in one of his own cases. The eye finally became quiet with a fair amount of vision. In one case in which the resident at Wills was operating and he assisting, because of a too small corneal incision, difficulty was encountered in delivering the lens. He introduced a small hook, and on extracting the lens was chagrined to see what appeared to be the entire iris hanging from the hook. On examination it was found to be a complete pigment cast of the posterior surface of the iris. This overgrowth of the uvea in diabetes has been pointed out by Greeff.

In reply to Dr. Langdon, Dr. Zentmayer said as he understood it, some clinicians denied the existence of a retinitis attributable to diabetes.

In reply to Dr. Ring, Dr. Zentmayer said that repeated examinations of the urine has been made and no albumin found.

Ring Ulcer of the Cornea Associated with Antrum Disease

Dr. Charles R. Head reported the clinical history of a man who had lost his left eye as the result of a progressive ulceration of the cornea, necessitating enucleation. Three months later the patient returned with a superficial ulceration of the remaining eye. A complete annular ulcer had formed at the limbus, with a tendency to encroach upon the pupillary area. A paracentesis of the right antrum by Dr. Fielding O. Lewis, resulted in the discovery of pus containing streptococci. Immediately following irrigation of the antrum the ocular condition improved and the patient was discharged after two weeks' treatment.

The patient was perfectly well for six weeks, and then had a recurrence of the ocular symptoms in an aggravated form. A second paracentesis of the antrum disclosed pus and daily irrigations of that sinus were followed by a rapid improvement in the condition of the cornea. There were no symptoms of sinus disease at any time, with the exception of a faint shadow by

transillumination. The fundus was healthy and the visual field was normal.

Dr. Posey said that despite the claims of Fish, Fromaget, Ziem, and others, he had found involvement of the cornea and the uveal tract in consequence of accessory sinusitis but rarely. He could, however, recall a case of herpetic keratitis of a dendriform type which had apparently been originated by an ethmoiditis complicating la grippe. A similar attack occurred in the cornea of the fellow eye some years later when the ethmoid cells became reinvolved. In association with the ocular and nasal inflammation, there was an herpetic eruption on the skin in the supply of the infra-orbital branches of the fifth nerve of the same side as the affected eye. Dr. Posey warned against the erroneous assumption that because an ocular inflammation occurs in conjunction with a sinusitis, it is necessarily dependent upon it, the deduction being only warranted when all other sources of the ocular affection have been dismissed and perceptible improvement has followed the treatment of the intranasal affection. To elucidate this point, he cited a case of herpes zoster ophthalmicus with dendriform haze of the cornea and with congestion of the ethmoid cells upon the affected side, both manifestations being in his opinion expressions of the inflammation of the fifth nerve in different parts of its supply, the neuritis having been induced by an anemic and depressed condition from which the patient had long been suffering.

Dr. Langdon considered the case very interesting in view of the difficulty in tracing the course of the infection from the antrum to the cornea. That the infection originated in the antrum can hardly be doubted after a study of the clinical course of the disease, but it is difficult to tell why the cornea should be selected as the site of a lesion secondary to an antrum infection. Cases where the uveal tract is first involved are not difficult to explain, or where the orbital tissues are involved, as in the case of a young negro woman, seen at the Presbyterian Hospital last summer. She had a very rapidly increasing orbital cellulitis. On examination the antrum of that side was found to be filled with pus; this

was cleaned out and the orbital condition rapidly cleared up. Such cases permit of an easy explanation of the mechanism of transfer. Had the conjunctiva in Dr. Heed's case been markedly involved it would be easy to understand the sequence of events, but the conjunctiva, I understand, was involved after the cornea. I would like to ask Dr. Heed what his theory is as to the route of the infection.

Dr. Hansell said that Dr. Heed did not mention that the skin in the neighborhood of the eye was hard, stiff, and infiltrated, presenting the appearance of erysipelas and was undoubtedly infected. Dr. Lewis believes that an opening exists in the floor of the orbit through which the orbit and the antrum are directly connected. It is difficult to understand why, if this communication is posterior to the anterior sheath of the orbital fascia, orbital cellulitis is not set up, but if anterior we can readily see that the infection may invade the anterior structure of the eye.

The recurrences of the corneal abscesses simultaneously with the collection of pus in the antrum point positively to a direct causal relation. The recovery, prompt and positive, of the ocular complication commencing immediately after the treatment of the antrum, confirms this relationship.

Motais' Operation for Ptosis

Dr. J. Hiland Dewey exhibited a girl, aged seventeen years, who had had ptosis of the right eye since babyhood, the condition being, probably, congenital. There was full action of the right superior rectus. Motais' operation was performed. The incision was not carried back to the cul-de-sac and then forward into the palpebral conjunctiva, as directed by Motais; instead, a cut was made in the conjunctiva just over the insertion of the superior rectus, the tongue of this muscle being dissected to a great extent subconjunctivally. A cut was then made in the palpebral conjunctiva at the superior border of the tarsus, and a pocket made in the lid between the tarsus and the skin down to the ciliary margin.

At this point Shoemaker's suggestion of making it an open operation was adopted, and an incision was made in the skin, however, just above the ciliary margin instead of just below the superior margin of the tarsus as he directs, and the sutures were passed through the skin close to the cilia.

If in any great number of cases, results like the present one can be obtained, the operation should be more generally adopted, as it leaves no disfiguring scar and there is nothing to indicate that an operation has been performed.

Dr. Zentmayer said that what strikes one in the excellent result secured by Dr. Dewey is the apparent absolute restoration of conditions to the normal. It would be impossible without previous knowledge for anyone to say which is the operated eye. In the operations in which a skin tongue is used there is usually a lifting of the lid away from the globe, as well as an elevation and a permanent scar.

Dr. Wm. T. Shoemaker, in repy to a question asked by Dr. Zentmayer, said that in his opinion the good results of the Motais operation were due to a firm fixation of the upper tarsal portion of the lid to the eyeball. He did not believe that the transference of the physiological action of the superior rectus muscle to the upper lid as claimed by Motais was possible, and repeated his previously published opinion that paralysis of the superior rectus muscle was no contraindication to the operation. He furthermore called attention to the advantages of the "open method" of operation, which he advocated in his contribution to the subject a few years ago and which Dr. Dewey followed in his case.

A Case of Retinitis Proliferans

Dr. Zentmayer presented a case of proliferative retinitis in a poorly nourished Italian man, aged twenty-four years. Six years ago he was in Dr. Posey's service at Wills Hospital, at which time he had a severe neuroretinitis with hemorrhages in the left eye. Two years ago he came under Dr. Zentmayer's care, complaining of failing vision in the right eye. At that

time no view of the fundus of the right eye was obtainable because of dense vitreous hemorrhages. The left eye presented changes suggestive of hyperplastic retinitis. Under tonic treatment and the use of potassium iodide the vitreous cleared up in part, and the patient was then lost sight of. He now presents in the right eye vitreous opacities so dense that no light comes from the fundus. In the other eye there is a characteristic greenish-white membranous brush beginning at the disk, the surface of which it almost entirely hides, and extending downward and outward along the vessels. A second band begins at the nasal margin of the disk and extends forward into the vitreous and shows the development of new-formed vessels. Both Wassermann and v. Pirquet tests were negative (made since exhibiting the patient). The patient has been placed upon potassium iodide and thyroid extract.

FEBRUARY 20

Mucous Patch on Eyelid

Dr. C. E. G. Shannon exhibited a man having an extensive mucous patch on the inner surface of the upper lid, with a rather punched-out, crescentic outline. The floor was bathed with an offensive, virulent discharge, and the severe inflammatory swelling of the lid associated with this condition suggested syphilitic tarsitis. The initial lesion appeared elsewhere three months previously. Spirocheta pallida were demonstrated by Dr. Rosenberger in spreads from the eyelid, and the Wassermann reaction was strongly positive.

Third Nerve Palsy

Dr. C. E. G. Shannon exhibited a colored man, aged fifty-three years, who had a complete palsy of the third nerve on the right

side. He had been under treatment for syphilis for a year at the age of nineteen years. The onset of the palsy was very rapid, becoming complete within three hours. The right lid was closed and the eyeball deflected to the right, while excursion inward, downward, and upward was entirely lost. The pupil was dilated and unresponsive. There was slight exophthalmos. By the second day the pupil had contracted and responded freely to stimulation, and within a few days there was slight recovery from the palsy of the extrinsic muscles and the levator. The Wassermann reaction was strongly positive.

Ruptured Choroid Due to Gunshot Wound

Dr. Frederick Krauss presented a case of rupture of the choroid, with extensive choroidal degeneration, resulting from a gunshot wound of the orbit. A 22-caliber rifle shot entered the upper outer part of the orbit and lodged in the apex near the optic nerve. It caused no disturbance and was allowed to remain. There was a large rent in the choroid in the macular region; beyond this there was a complete atrophy of the choroid on the temporal side, apparently to the ciliary body. The other half of the retina was normal. There was hemianopsia. The vision has improved from hand movement to $\frac{5}{40}$ of normal.

Glioma of the Retina

Dr. George S. Crampton exhibited a boy, aged five years, having an intra-ocular growth, which in some respects simulated a sarcoma of the choroid, although subsequent microscopic study proved it to be a glioma of the retina. The eye was apparently healthy until eighteen months ago, when it was noticed to turn in, and one year later it was found to be blind. Soon afterward slight redness and other threatening symptoms were noted. When exhibited a large, light brown, slightly nodular mass filled the posterior chamber and could be easily studied

through the dilated fixed pupil and clear lens. The tension was plus two, with resultant slight ciliary staphyloma. The child was robust and otherwise healthy, and no local glandular involvement was noted. The misleading brownish color was due to hemorrhages in the deeper portions of the growth.

Choroideremia

Dr. Harold G. Goldberg exhibited and briefly described two cases which he believed to present a congenital absence of the choroid—choroideremia. Brother and sister, aged respectively twenty and twelve years. The general characteristics of the cases were alike. There was a complete absence of the choroid at the periphery, so that this membrane was represented by an irregular ring varying in breadth in the more extensive case from 4 to 6 cm. by ophthalmoscopic measurement. The retinal and ciliary vessels were seen coursing over the bare areas. The point of particular interest was the character of the pigment, and it was upon this peculiarity that the diagnosis was chiefly based. This differed from the products of degeneration in presenting a healthy cellular appearance, and was believed to be the retinal pigment epithelium which had accumulated at the line of demarcation. The same general character of pigment was found elsewhere throughout the fundus. In the boy there was also a nuclear opacity of both lenses and an absence of the choroid surrounding the disk.

Dr. G. E. de Schweinitz, discussing Dr. Goldberg's cases, said that in his experience similar lesions had been encountered three times. In one patient, a comparatively young man, after the subsidence of a violent uveitis, the entire periphery of the eye-ground exhibited large oval areas, separated by lines of pigment, of complete absence of choroidal tissue, many of them crossed by broad vessels. In a second patient, a woman, aged thirty-five years, precisely similar areas were visible as they were in a man of about forty years, in one eye, the other having been destroyed by an injury. In none of these patients, however,

had the lines of pigment exhibited the characters seen in Dr. Goldberg's patients, that is, the pigment borders were like those usually bounding an area of retinochoroidal atrophy. Admitting the value of Dr. Goldberg's argument, and the applicability of the theory advanced by Collins and Mayou in explanation of failure of the development of the choroid, Dr. de Schweinitz would hesitate to classify the fundus lesions in Dr. Goldberg's patient with choroideremia, as this term is ordinarily understood. It seemed to him, with the widespread finer lesions which were present in the central areas of the fundus, which certainly represented spots of retinochoroiditis, something like those seen in inherited syphilis (although he understood this taint had been eliminated by a Wassermann test), as well as with the changes and opacities in the vitreous, it was difficult to believe that an inflammatory process, probably intra-uterine, was altogether innocent of etiological relationship to this condition. It was, of course, perfectly possible that the peripheral areas represented congenital failures in the development of the choroid, and that the central lesions were of an inflammatory origin, in short, that there was a combination of two processes. It seemed to him, fully realizing the difficulty of depicting such lesions with accuracy, that the water-colors exhibited were imperfect in that the finer lesions were not represented, and he hoped that this might be corrected, as Dr. Goldberg's paper and patients were of unusual importance and interest.

Dr. Zentmayer said that based upon the very brief opportunity he had to examine the cases he would view them as instances of intra-uterine inflammation. There were, however, some features indicating atypical development: occurrence in two members of the same family; having the same general characteristics; the lesions having a conformation explainable upon the hypothesis of Collins and Mayou. In these cases the supposition being that there is a failure of development of the long ciliary vessels. Accepting this view, still the cases do not conform to the type described under the name of "choroideremia." His recollection of the conditions present in the cases collected by Nettleship

was that in all the lesion was bilateral and there was an entire absence of the choroid except for a small area at the macula.

Dr. Holloway stated that he thought in the few reports collected by Nettleship and in the recent case of choroideremia associated with retinitis pigmentosa, reported by Alexander, that a few patches of choroidal tissue remained, one of these being usually in the macula. The much contracted fields shown by Dr. Goldberg's patients conformed to those usually found, although Alexander's patient had a ring scotoma. Bradburne had recently referred to a patient showing as a solitary lesion a large coloboma about the disk, such as was present in the left eye of one of these patients, and Jessop had also referred to an analogous case, both the patients being hyperopic.

Bilateral Aniridia; Ectopia Lentis; Pathological Cupping of Disks

Dr. T. B. Holloway exhibited a boy, aged ten years, who had recently been admitted to the Pennsylvania Institution for the Instruction of the Blind at Overbrook. The following history was obtained from his application blank:

Impaired vision was first noted at the age of three years. He has never had convulsions or any serious illness, neither has he any deformity aside from that described below. He is the oldest of three brothers. The brothers, parents, and grandparents are said to be free from any ocular defect, deafness, or insanity. There is no history of consanguinity. Upon examination there can be noted a horizontal nystagmus, with a tendency to lateral deviation of the eyes to the left. The corneæ measured 11 mm., and were free from any pathological lesions. Careful examination failed to show any evidences of iris tissue in either eye; the lenses were displaced directly upward, so that the lower border of each lens corresponded to the horizontal midline of the cornea. Each lens was clear aside from a few very vague dots, whether these were congenital or acquired is an open question. At the lateral angles the radiating fibers of the suspensory ligament could be seen,

but there was a wide defect directly downward. The fundus examination, either through the aphakic or phakic portion, revealed marked pallor of the disks with practically complete deep cups and characteristic bending of the vessels. The tension was normal. The refraction of the eyes had not been carefully worked out, but a minus lens somewhat improved vision.

Punctate Cataract

Dr. T. B. Holloway exhibited a male, aged thirty-two years, who had entered the University Hospital complaining of chronic diarrhea, nausea, dizziness, headache, and general weakness. He was poorly nourished and had a slight general glandular enlargement, but denied venereal disease. There were no definite lesions found in the heart, lungs, or liver. On one or two occasions a faint trace of albumin and a few hyaline casts had been found in the urine. An *x*-ray examination showed ptosis of the transverse colon, splenic and hepatic flexures.

In each lens there was a subcapsular bar-like grayish opacity, and surrounding this in the anterior cortical layers of the lens could be noted numerous punctate dots, showing a distinctly blue color by oblique illumination. A similar layer of dots could be noted in the posterior cortical layers, but there was no central posterior opacity, and the nucleus appeared to be clear. These dots did not extend to the very periphery of the lens, but seemed to conform in their extent to a large lamellar cataract. The dots were most numerous at the periphery of this area.

The patient has two brothers, one of whom is said to have weak eyes, but his exact ocular condition is not known.

A Case of Epidermolysis Bullosa and the Ocular Lesions

Dr. George E. de Schweinitz reported the history of a man, aged thirty-five years, who since childhood had been the subject of this rare cutaneous condition, the bleb formation having

chiefly afflicted his neck, upper back, wrists, and hands. For sixteen years he had been subject, entirely in the right eye, to attacks of bleb formation lasting from two hours to two days, and always appearing in the early morning. There is a vague history of foreign body on the cornea some time prior to the formation of the bullæ, which may have been the starting-point of the corneal disease. Treatment had been entirely unsatisfactory. Dr. de Schweinitz compared this condition to the so-called relapsing erosion of the cornea, and discussed the mechanism of the formation of corneal bullæ, making special reference to the change in the form of the basal cells as a determining factor in the loosening of the epithelium from Bowman's membrane and the forcing beneath it of fluid, and comparing this to the changes which had been found in the skin in this disease, where there is a degeneration of the basic portion of the rete, local irritations causing exudation, which thus detaches the loosely fastened rete and gives rise to bleb formation.

Dr. Ziegler, in discussing Dr. de Schweinitz's cases of epidermolysis bullosa, stated that he had recently seen a case of this character that suggested some dependence on an intranasal lesion of the same side and asked whether the nasal disturbance and the skin lesions in the case cited were confined to the side on which the eye was involved, and whether the nasal lesion was located on the septum.

In his own case, prompt relief was secured by the internal exhibition of morphine, hyoscine, pilocarpine, and strychnine, which combination he had previously recommended as an abortifacient in acute glaucomatic attacks. This would seem to indicate some underlying pathogenic factor in the sympathetic nervous system, which was manifested by a local lymphatic dyscrasia. He had also found some advantage in the use of positive galvanism applied directly to the eye.

Closing the discussion of his paper, Dr. de Schweinitz said in reply to Dr. Ziegler that the nasal surgeon had reported ethmoiditis, but he had not stated whether it was more pronounced on the right side. It probably was, however, as pain and nasal

discomfort had been greater on this side. He though the origin of the formation of bulla in the cornea had probably started in some small injury, for example, by a foreign body, whereby the epithelium had been loosened, changes had taken place in the foot cells, so that their firm attachment to Bowman's membrane was lost, fluid was forced beneath the epithelium, and the formation of a bleb followed. Doubtless the cornea of a patient with this skin disease was prone to the formation of blebs on slight provocation, just as his skin became the seat of bullæ under the influence of trifling irritations.

Concerning Dystrophy of the Corneal Epithelium, with the Report of Two Cases

Dr. G. E. de Schweinitz reported the case history of two patients, a man, aged seventy-three years, and a woman, aged about sixty years, who showed in typical manner the lesions described by Fuchs under the title of dystrophy of the corneal epithelium. In the first patient these lesions appeared thirteen years after a successful cataract extraction, which had secured for him normal vision; tension was not raised, being only 18 mm. with the Schiotz tonometer. The lesion was unilateral. In the case of the woman the lesion was bilateral; more pronounced in the right than in the left eye; no sign of increased tension; Schiotz tonometer registered 23½ mm. In neither of the patients was there the slightest local irritation. Treatment was of no avail in the man. Prolonged dionin treatment, associated with the administration of small doses of biniodide of mercury appeared to be slightly beneficial in the woman. Neither patient exhibited any constitutional disease. Dr. de Schweinitz briefly discussed the differential diagnosis between this disease, keratitis profunda, interstitial keratitis, senile sclerosis of the cornea, and glaucomatous corneal haze.

Eye Injuries from Aniline, with Report of Four Cases of Injury from Aniline Pencils

Dr. George S. Crampton sketched the history of aniline from the discovery of amidobenzole by Unverdorben, in 1826, as a product of the dry distillation of indigo to the comparatively recent studies of Chiari, Bergen, Vogt, and Graflin on the effects of aniline preparations upon the tissues of the eye.

Vogt's experiments upon rabbits led to the conclusion that only basic aniline colors are injurious, and a substitution of acid salts was recommended for use in the manufacture of indelible inks and pencils. Graflin dusted about the same amounts of crystal violet, Victoria blue, and malachite green into the conjunctival sacs of rabbits; these produced panophthalmitis. The following caused inflammation of the conjunctiva and cornea, namely: prein, safranin, uramin, rhodamin B, and rhodamin 6, G. Methylene blue irritated the conjunctiva. Congo red, tetrazin, eosin, and water blue give rise to no irritation. The foregoing results were confirmed by the examination of a group of workmen in aniline colors.

In treating eye injuries from aniline pencils efforts should be made to remove the particle of lead as soon as possible, although it be deeply embedded in the orbital or ocular tissues, as the vitality of the corneal epithelium is quickly diminished by the outflow of dye. Complete exfoliation of the epithelium results if the amount of aniline color be excessive or its presence long continued, and opacities and serious loss of vision may result. The disfigurement from the staining of the tissues is unimportant, as it disappears rapidly. Vogt recommends prompt irrigation with a 5 per cent. solution of tannin instead of the usual collyria.

Case I.—A man, aged forty years, while wrestling with a friend who had an aniline pencil in his mouth, was wounded by the point penetrating deeply into the internal rectus muscle of the left eye. The pencil entered about 4 mm. back of the corneal limbus and broke off in the tissues, leaving the point and 3 or

4 mm. of the cedar between the muscle and the sclera. The wound was deep and on account of the attenuated nature of the exposed sclera the removal of the foreign body proved difficult, as rupture was feared. Seventeen days passed before the last particles of cedar were removed; in the meantime the corneal epithelium became stripped and largely regenerated, leaving, however, a large dense central macula.

The tenth day after the injury, following an unusual outflow of pigment from the depths of the wound, the lids were found to be rather firmly attached to the eyeball by a thick layer of fibrin-like material, and excursion was much limited. The surfaces bled freely while being separated by means of a moist cotton applicator. The exudate disappeared rapidly and liquid alboline prevented further adhesions. Rupture of the eyeball was avoided, but the corneal macula will be a permanent impediment to good vision.

Case II.—A man, aged twenty years, was struck in the eye by a fragment of aniline pencil, which was removed two hours later. Six hours after the injury the corneal epithelium had disappeared except at the limbus, and there was intense pain and photophobia. The epithelium regenerated in a few days, and there was no loss of vision.

Case III.—A man, aged eighteen years, was struck beneath the supra-orbital ridge by the point of an aniline pencil, which entered 2 cm. above the inner canthus and broke off in the wound. None of the dye reached the cornea or conjunctiva. It was not known at the time that any lead had been left in the wound. On the twelfth day it was removed by incision into a painful, fluctuating mass.

Case IV.—A young man appeared for treatment a few hours after having been struck in the eye by a flying chip from an aniline pencil. The staining was moderate, as the foreign body was not retained and the corneal epithelium was not denuded. Complete recovery resulted in a few days.

Dr. Holloway referred to the serious nature of burns of the eye from the strong alkalies and carbolic acid, which has but feeble

acid properties, and recalled the recently reported cases of caustic burns of the eye from golf-ball accidents. He stated that Vogt, in addition to his aniline experiments, had also experimented with the strong acids and alkalies, and Vogt thought the acids less injurious because they acted upon the epithelial covering of the eye, forming a thin protective layer of coagulated albumin, which tended to prevent further action on the deeper structures.

Dr. Shumway mentioned the case of a young girl who had been struck in the cornea by a chip from the point of an aniline pencil. A corneal ulcer resulted which, while healing promptly, proved to be the exciting cause of a convergent strabismus, necessitating operation.

MARCH 20

Excision of Tarsus and Palpebral Conjunctiva in Third Stage of Trachoma

Dr. Howard F. Hansell exhibited two cases in which this operation was followed by marked improvement in vision. The corneæ became clear through the absorption of some of the exudate and by the disappearance of much of the vascularity. The photophobia, lacrimation, and pain which had been prominent symptoms were entirely relieved.

The operation consisted in a separation of the posterior layer of the conjunctiva, which in most cases must include at least the anterior part of the superior fornix, from the tarsus. It is loosely attached and easily stripped off, showing the glistening yellow surface of the distorted tarsus. The incision was made in both cases horizontally along the posterior or upper border of the tarsus. The tarsus having been freed from the conjunctiva above and the orbicularis and skin is, with the attached palpebral conjunctiva, cut away at or near its ciliary border. No sutures

are used. The lower cut edge of the conjunctiva becomes attached to the lid. The reaction is insignificant.

After recovery the lid, aside from being much softer, appears but little changed from its previous condition.

Dr. Zentmayer said that just today he had heard from the physician in charge of a patient from out of town on whom he had some two years ago performed total excision of the tarsus and resection of the conjunctiva for a very severe luxuriant type of trachoma. The doctor considered the result perfect, as the eyes were entirely free from irritation and vision almost normal. Instead of a slight ptosis, as one might expect from the removal of the principal attachment of the levator, there was for a time a retraction of the upper lids.

Cholesterin Crystals in the Anterior Chamber

Dr. Edward A. Shumway demonstrated a case showing cholesterin crystals in the anterior chamber subsequent to needling of a congenital cataract. The patient was a young woman, twenty years of age, and the glittering plates appeared in the aqueous after each needling. The lens was nearly absorbed. Dr. Shumway discussed briefly the occurrence of cholesterin in other parts of the eye, and referred to the literature relating to its presence in the senile and congenital types of cataract and its occasional appearance in the anterior chamber after operation.

Dr. Zentmayer referred to a case that he had presented to the Section some years ago, in which cholesterin crystals were present in the vitreous, lens, iris, and bottom of the anterior chamber. Later he had washed the crystals from the anterior chamber, but soon after the anterior chamber was restored it refilled with crystals. It is probable that they had their origin in some pathological change within the uveal tract, and that the crystals osmosed through the suspensory ligament into the anterior chamber.

Dr. Samuel D. Risley recalled three cases in which a profuse collection of cholesterin crystals was found in the anterior

chamber, but in each case they were associated with prolonged uveal disease occurring in childhood and had led to loss of vision. These experiences had led him to associate the presence of cholesterin with chronic uveal disease. In one case there were recurring acute exacerbations of iridocyclitis accompanied by an increase of the cholesterin masses in the anterior chamber. Thinking they might be a source of irritation he did a paracentesis, evacuating the anterior chamber. The pain was immediately relieved and the inflammatory symptoms slowly subsided. The patient was discharged from the wards and returned at intervals as an outdoor patient, but had no subsequent recurrence of acute trouble while under observation.

Dr. Ring recalled having exhibited before the Section some some few years ago a patient showing extensive cholesterin crystals in the anterior chamber. There was in this instance chronic uveal disease, and when last seen the eye was quiet with the crystals partly absorbed, under alterative treatment directed to the uveal tract.

Dr. Shumway, in closing, said there were no signs of inflammation of the uveal tract in his patient. Nystagmus was present and central vision was defective, although no fundus lesion could be seen. He said that cholesterin appeared during fatty degeneration of proteid matter, and therefore was frequently found after inflammatory processes from degeneration of the cell masses; also after hemorrhage, as it was normally present, in solution, in small amounts, in the blood. In one case Fuchs had thought its presence was the cause of a severe attack of iridocyclitis.

Unusual Type of Congenital Cataract

Dr. T. B. Holloway exhibited two patients that he had expected to show at the February meeting of the Section. The patients were brothers, Russian Jews, aged twelve and eleven years, who came under observation at the University Hospital.

By ophthalmoscopic examination a few extremely delicate pinpoint dots could be noted in the lens. These spots were

much more readily seen when studied by oblique illumination, and it could then be demonstrated that in the deeper layers of each lens, centrally placed, there was a cluster of small grayish dots that formed a layer, having the concavity of its surface directed forward. The apparent diameter of this area was about 5 mm. In one patient, in the right eye, there was one anterior dot not deeply placed, while in the other patient the right eye showed several anterior dots. In neither patient could any anterior opacity be noted in the anterior layers of the left eye.

The father, mother, and three sisters had also been examined, and in none of these was there present any congenital ocular condition. Attention was also called to the ease with which these opacities could be overlooked during the course of routine hospital practice.

Reference was made to the observations of Pearce, Rankine, and Ormond concerning the ocular defects in Mongolian imbeciles. Among other numerous congenital defects lenticular opacities were observed in 19 of the 28 cases studied.

Posterior Cortical Cataract of Unusual Form

Dr. William Zentmayer presented a case of unusual form of posterior cortical cataract. The patient was a man, forty-seven years of age, a hammersmith by occupation. He claimed to have had good vision until three months ago, when it began rather rapidly to fail. Vision in each eye = 6/12. Both eyes presented at the posterior pole of the lens a small, dense, round opacity surrounded by a narrow zone of lesser density, the whole exactly filling the pupillary area (3.5 mm.) As under mydriasis v. = 6/6, a narrow iridectomy was made upward so that it would have the most favorable position if extraction became necessary. No benefit to vision having resulted from the operation, he proposed to do a Homer Smith preparatory capsulotomy and extract the lens. Notwithstanding the history, Dr. Zentmayer expressed the opinion that the opacities were, in part at least, congenital in origin, and suggested that the occupation had

favored development of the opacity, which when it had reached the dimension of the pupil had obscured the vision to the extent that the patient could no longer work.

Extensive Foreign Body Removed from Right Orbit

Dr. G. Oram Ring reported the history of a case seen at the Protestant Episcopal Hospital early in January. The patient was a well-developed Italian of large physique. He was suffering from an extensive lacerated wound, beginning about the centre of the right eyebrow and extending downward and inward through the eyelid to a point just above the inner canthus.

The tissues were not only lacerated but crushed, as though injured by the exercise of great force. When the case was first seen by Dr. Ring the wound had been sewed up and no foreign body had been removed; cornea somewhat hazy, anterior chamber partly filled with blood, conjunctiva markedly chemosed, especially up and in, some proptosis was present, and no fundus view possible.

The upper lid was intensely swollen, overlapping the lower, and could only be elevated with difficulty. Concussion of the brain was present, but no evidence of fracture elicited.

An immediate *x*-ray was ordered and disclosed a large foreign body in the orbit, 1 inch long by $\frac{3}{4}$ inch broad, the most forward portion penetrating the orbital plate of the frontal bone in the region of the frontal sinus.

In the meantime an intelligent history was elicited which pointed to an explosion of a railroad torpedo which the patient had struck with a hammer.

The wound having been carefully opened and probed, an irregular piece of tin was seized with a hemostat and removed. It proved very resistant, probably due to impaction in the inner orbital wall. An iodoform drain was inserted and the healing was in the main uneventful.

When last seen the eye was quiet, but the ultimate vision was not secured, as the patient had not reported for about six weeks.

Dr. Sweet referred to several cases in which a piece of steel had been removed from the anterior portion of the orbit, but in nearly every instance the fragment was of large size and the eyeball was subsequently lost as a result of the original injury. He believed that even fairly large-sized particles that had passed into the orbit back of the globe, with or without double perforation of the eyeball, could be allowed to remain undisturbed if not lodged in the optic nerve on its sheath, providing there were no ocular symptoms. The bodies soon become encysted and cause no trouble. In instances in which subsequent enucleation of the eyeball becomes necessary, the magnet often fails to exert appreciable traction upon the metal embedded in the orbital tissues, and it is advisable to allow the steel to remain rather than make an extensive dissection to locate the foreign body, with the possible result of causing a shrunken socket.

Dr. Posey recalled a case of gunshot wound of the orbit in which he had permitted the shot to remain *in situ* in the outer part of the orbit, as it was manifestedly giving rise to no disturbance. In another case in which a pistol ball had entered the left cheek, and having traversed the nasal passages, had become lodged in the crotch formed by the entrance of the optic nerve into the globe; the removal of the ball was necessitated by the development of traumatic delirium. Dr. Posey also gave the details of the successful removal of a small foreign body from the orbit, which had lodged in the sheath of the optic nerve some 5 mm. behind the globe, after having traversed the coats of the eye to the nasal side. Division of the internal rectus muscle was necessitated before the foreign body was removed by the magnet. The resultant vision was 5/9.

Dr. Shumway said that the small magnets were not strong enough to disengage a rough piece of metal when it was embedded in the tissue. He had cut down on a foreign body in the eyelid on one occasion, and although it was nearly freed by the dissection, it could not be drawn from its bed by a Parker magnet, but had to be pulled out by forceps. This fact would explain

the difficulty of removing foreign bodies from the orbit in cases of double perforation of the eyeball.

Dr. Turner mentioned the case of a man, aged fifty years, who shot himself in the mouth with a 32-caliber revolver, the ball passing through the hard palate and lodging in the orbit below the optic nerve. He was a dissipated character and paid but little attention to the wound. About two weeks later the ball was extracted through an opening in the floor of the orbit, the eyeball and nerve being uninjured. The vision with glasses is 6/6.

Bilateral Non-traumatic Detachment of the Retina

Dr. H. Maxwell Langdon reported three cases of bilateral non-traumatic detachment of the retina. The first case was a man, aged twenty-two years, with the following history: His mother had her right eye enucleated when twenty years of age, following intra-ocular hemorrhage. When six years of age he had 4 D. of myopia; in the next year it increased to 6 D. in the right eye, and the retina of the left was completely detached, the eye being enucleated on account of intra-ocular hemorrhage. Six years later the myopia had increased to 6.50 D. in the right eye, and remained the same until seven years later, when the retina of this eye became detached. He was put to bed and the usual measures were taken, but without improvement. Subconjunctival puncture of the sclera was not done.

He has always enjoyed good health except for the fact that about once a year he had a major epileptic convulsion, the first when he was sixteen years old. His Wassermann is negative.

Case II was very similar. A man, aged twenty-two years, when ten years old was found to be blind in the left eye. He was seen by Dr. Loring, in Boston, who made a diagnosis of cataract and needled the lens, but the retina was almost completely detached and no vision resulted. In February, 1912, near objects were blurred and vision gradually fell, until, when seen nine months later, it was 2/60. At that time the right eye showed a clear lens, some vitreous haze, a pale disk, and a completely detached retina

except for a small area in the lower outer portion of the fundus. The disk level was about minus 3 D. and the general retinal level plus 12 D. He had always been well except for his ocular troubles. No Wassermann was obtained, as he was seen but once.

The third was a man, aged twenty-two years, who had chronic interstitial nephritis. Two years ago Dr. T. B. Holloway found his eyes to be normal in every way except for a low myopia. At that time his blood pressure was 190. When seen by Dr. J. M. Griscom, two months ago, there was a moderately intense neuroretinitis in each eye with numerous hemorrhages and masses of exudate. Two weeks later he had an unusual amount of retinal edema with wiry arteries and many hemorrhages. When seen a fortnight later the lower half of each retina was found detached and stretched across the lower fundus like a shelf on which the retinal vessels were seen as dark lines.

The myopia in the first two cases seems hardly to account for the detachment, as in the first case it was never over 7 D., and in the second case was but 3 D. in the eye last affected. It would seem that there must have been a congenital weakness in the choroidal vessels or possibly in the formation of the vitreous bodies. In the third case the detachment was undoubtedly due to a choroidal hemorrhage or subretinal exudate.

In reference to one of the cases whose history has been cited by Dr. Langdon, Dr. Holloway thought that in view of the age of the patient, and the fact that his eye-grounds were in good condition two years before he had come under observation with such marked retinal and vascular disturbance, that at least part of the pronounced changes in the vessels might be accounted for by assuming the existence of a definite amount of cerebral edema. Bramwell several years ago had again called attention to this possibility after his experience with a patient in whom the diagnosis rested between brain abscess and uremia. The patient was trephined, relieving many of the symptoms, but a subsequent study of the case showed it to be one of uremia. Following this, Cushing resorted to decompression in cases of nephritis.

Dr. Holloway also referred to the rapidity with which retinal

and disk changes may occur in these cases, and stated that in several instances he had seen choking of the disk that he could not definitely differentiate from the condition that might be produced by an intracranial growth.

Dr. Posey spoke of the significance of detached retina in disease of the retina caused by Bright's disease, and said that it was a most unfavorable symptom, as its occurrence was usually followed by the death of the patient. He had recently seen an old man in apparent good health, with hypermetropic eyes, and who had suffered no traumatism, in whom both retina were detached. He had been unable to find any cause for the retinal condition.

Thiersch Grafts for the Treatment of Epithelioma

Dr. McCluney Radcliffe exhibited a case of epithelioma of the lower lid of a woman, aged sixty-eight years, in which he had successfully applied three Thiersch grafts along the entire border of the lid within a period of five years. The extension of the growth always began at the extremity of the graft, but never under it. He attributed his success to the thorough curettings and the extreme thinness of the grafts.

Dr. Posey referred to the pedicled flap operation for the restoration of the lid after the removal of neoplasms, and described an operation which he had recently performed upon a case in which the outer half of the lid had been removed with an epithelioma, and in which he had succeeded in establishing an epithelial surface for the bulbar portion of the skin-flap by turning down a flap of skin from the fold just below the brow in such a way that the epithelial surface was brought into contact with the globe. The pedicled flap was then superimposed upon this primary flap and united to it and the adjacent remnant of lid by sutures. Healing was prompt and the patient recovered with a serviceable lid, while the cosmetic result was admirable.

Dr. Samuel D. Risley had seen the case reported, through Dr. Radcliffe's courtesy, and inquired if the recurrences of disease were not at the border of the graft. As he remembered the case

the graft had remained healthy. Dr. Risley had employed these thin skin grafts many times for epithelioma of the eyelids with great satisfaction, simply scraping away all of the diseased tissue and covering the denuded area with healthy epithelium. Correct technique, however, was important. The graft must include only the superficial living epithelium, and should not be immersed in antiseptic fluids, but applied directly from the surface of the razor to the denuded surface.

The Use of Mixed Infection Vaccine in Exudative Choroiditis

Dr. S. Lewis Ziegler discussed the value of polyvalent vaccines in ocular affections of unknown bacterial origin. It has been claimed that mixed infection phylacogen is an aqueous solution of the metabolic substance generated by multiple organisms and filtered through porcelain. While its action may be bactericidal it is more probably phagocytic, and in some cases acts as a pure lymphogogue. Like tuberculin, the initial dosage has been too high. In the adult from 2 to 5 c.c. should be injected into the arm, while 1 to 2 c.c. is sufficient for children. This dose should be repeated daily, or at intervals of two or three days. The systemic reaction is mild. Marked cellulitis may appear at the site of the injection. The ocular reaction is usually slight. There is first noted a sudden change in the color of the exudate from yellow to white, and a prompt absorption of the hypopyon. This is soon followed by a rapid disappearance of the vitreous deposit and a noticeable increase in the transparency of the ocular media.

Dr. Ziegler reported two cases, one of endogenous origin and the other of exogenous origin, the latter being exhibited. The first case was a male, aged thirty-nine years, whose left eye had been inflamed two weeks. Vision had been bad since a similar attack ten years ago. Metastasis was suspected but not demonstrable. The pupil was slightly dilated, iris muddy, ciliary congestion, fundus details not visible, but oblique illumination showed yellowish vitreous exudate. Transillumination

gave a uniform glow. On January 16, 1913, 2 c.c. were injected in the arm followed by considerable systemic reaction. On the following day the vitreous exudate appeared whiter and the fundus reflex less hazy. Injections were repeated three times in the following week, when the exudate was nearly all absorbed and vision had improved from 5/200 to 20/200. A large patch of old choroidal atrophy could be seen on nasal side. Nine months later he reported that the eye was perfectly quiet, and the vision as good as before the attack.

The second case (patient exhibited) was a boy, aged six years, who was struck in the left eye by a sharp-pointed stick one month ago. He was referred to Wills Eye Hospital two weeks later by the family physician. The vision of the left eye was *nil* and the pupil under full mydriasis. The scar of perforating wound could be seen at the sclerocorneal junction on the temporal side, with small iris adhesion. The lens was clear and the vitreous was filled with a greenish-yellow exudate, the flocculent surface of which floated when the globe was moved. There was a small hypopyon and slight ciliary congestion. Tension minus 1.

One c.c. was injected March 3, 1913, followed by slight systemic reaction and soreness of arm. Two days later the eye was much improved and the hypopyon had disappeared, the exudate had changed to a whitish color and much of the flocculent material had disappeared. Three subsequent injections on alternate days caused marked absorption. Oblique illumination then revealed a pouting, jagged wound in the ciliary body. The eye is now quiet, looks normal, and is rapidly convalescing. Finger movements can be noted by the patient.

Dr. Radcliffe spoke of the marked improvement in Dr. Ziegler's patient, as he had had the opportunity of seeing the case prior to the first treatment.

A Phlebolith of the Eyelid

Dr. George S. Crampton mentioned the usefulness of the *x*-ray in locating vein stones which are most generally found

in the pelvic veins during a search for some other foreign body. Thurston Holland claims they occur so frequently in persons over forty that in his 600 radiographs it is the exception not to find some of these shadows. Clarke states that, although the exact metamorphosis does not seem to be recorded, phleboliths are defined as having originally been white thrombi in veins which have undergone calcification analogous to that of arterioliths in arteries. Apparently the calcification starts about a central nucleus, forming layer after layer, like the growth of a pearl.

A man, aged twenty-eight years, had a small net-work of varicose veins, about 1 c.c. in diameter, beneath the skin of the lower eyelid. On palpation a shot-like body was found in a vein and removed through a small incision. The phlebolith, which was white, round, and quite hard, was the size of a No. 6 shot and resembled a lusterless pearl. The patient had been aware of its presence for nine years. There was no history of traumatism, rheumatism, or syphilis.

Glioma of Retina, Pathological Report

Dr. George S. Crampton and Dr. Nelson M. Brinkerhoff (by invitation) described the pathological findings of a case of glioma of the retina which was exhibited before the Section, previous to operation, and regarding the diagnosis of which some doubt was expressed, as in some aspects the growth, on account of its brownish color, resembled a sarcoma of the choroid.

After removal the eyeball, with the exception of the nerve, which was swollen to a marked degree, was of normal appearance. On horizontal section the anterior chamber was found to be of normal depth. The iris and ciliary body were thickened. The lens was clear and occupied its normal position. The growth, situated in the posterior half of the globe, was grayish in color and extended forward on the temporal side to the ciliary body, the remainder of the vitreous chamber being filled with exudate

and blood. On microscopic section the growth proved to be a glioma. The retina was crowded from the temporal side and forward, probably indicating that the tumor originated in its outer granular layer. The growth, arranged in small cellular groups, invaded the choroid and vitreous and pierced the sclera. The nerve was invaded.

APRIL 17

A Case of Paralysis of Divergence

Dr. William Zentmayer exhibited a case of divergence paralysis and demonstrated the characteristic peculiarities of the diplopia. According to Duane, there is a sudden development of homonymous diplopia, which is most marked for distance and diminishes with mathematical regularity as the light is brought toward the patient, until a point is reached where there is orthophoria, changing rapidly to exophoria, when the light is brought still closer. The images of the lights approach slightly as the light is carried into the lateral fields. There is a convergent squint, but no restrictions of the movements of the eyes in any direction.

Symmetrical Posterior Cortical Opacities

Dr. William Zentmayer exhibited the patient shown at the previous meeting with symmetrical posterior cortical opacities. A Homer Smith preliminary capsulotomy was made and twenty-four hours later the lens was removed. The lens had become considerably swollen and the cortical matter welled out into the anterior chamber and from the wound while the incision was being made; otherwise there was no complication. He has 6/6 vision.

Dr. Ziegler stated that he considered preliminary cystotomy

a useful procedure in immature cataract. He usually made a superficial V-shaped incision with his knife needle, following somewhat the technique of his incision for iridotomy. The single disadvantage of the procedure was the shallow anterior chamber which was sure to follow the rapid swelling of the cortical unless the extraction was made within a period of twenty-four hours or less. This, of course, made the introduction of the Graefe knife more difficult, and in a recent case was followed by a spasmodic extrusion of the lens by the patient, due probably to a partial dislocation during the cystotomy.

Dr. Radcliffe reported favorable results with the Homer Smith operation in immature cataracts, but agreed with Dr. Ziegler that it materially narrowed the anterior chamber. He advised removing the lens within twenty-four hours after the primary incision of the capsule.

Thrombosis of a Sclerosed Retinal Artery without Signs of General Arteriosclerosis

Dr. H. Maxwell Langdon exhibited a man, aged fifty years, by occupation a watchmaker, who complained that after doing a difficult piece of watch repairing he found the vision of the left eye blurred, especially in the upper field. The central vision of the right eye was 6/20 and the left 6/10. Corrected central vision was 6/5 in each eye, with a slight eccentric fixation in the left. Externally the conditions were normal. The media were clear, both disks were normal, with good color and clear margins. The arteries of the right eye showed a slight increase in the light streak, and some irregularity of caliber, especially in the superior nasal branch. In the left the conditions were much more marked, the arteries being decidedly sclerotic, with the lower branch apparently thrombosed, the entire lower portion of the retina being edematous, and the course of the retinal vessels obscured. His personal and family history were negative. The urine was normal with a specific gravity of 1020. There was

no albumin or sugar. The pulse was 74 and the blood pressure 165 systolic. He had a mitral regurgitant lesion. The Wassermann was negative.

Thrombosis of a Retinal Artery in an Apparently Healthy Man

Dr. H. Maxwell Langdon exhibited a man, aged twenty-six years, who was a color-matcher in an ink factory. There was no previous ocular trouble except occasional severe frontal headaches, especially over the left eye. Five days before he was seen the vision of the left eye became suddenly blurred, especially in the lower portion of the field, and including central vision. On examination no external abnormalities were noted. Ophthalmoscopically the right eye was normal with about 1.5 D. of hyperopia. The left had clear media, with a normally colored disk, with clear margins. The retinal vessels were normal except the superior temporal artery, which seemed to suddenly disappear in a mass of retinal edema. There was little or no pigment change, and no hemorrhages. The central vision was 6/60 and that of the right was 6/5. The personal and family history were negative, Wassermann negative, tuberculin test and physical examination negative for tuberculosis. The urine was negative; systolic blood pressure, 135; pulse, 72; hemoglobin, 89 per cent.; reds, 4,600,000; whites, 7500; heart normal. In short a most complete physical examination made by Dr. William Drayton was absolutely negative. The retinal edema disappeared under iodides, and the artery was seen as a bloodless, shrunken, shiny line. The central vision rose with the correction of a fairly high astigmatism to 6/10 eccentric, but the changes in the field still persist.

Hole in the Macula

Dr. A. C. Sautter exhibited a case of macular hole in a colored boy, aged eleven years, who had been struck in the left eye with a potato two years previously. Since the accident vision in this eye has been much impaired.

Ophthalmoscopic examination showed a small, pigmented, floating vitreous opacity, atrophic disk with well-defined margins, slight reduction in size of the retinal arteries, a macular branch in part covered with connective tissue, and a patch of old retinochoroiditis about three and half times the area of the disk above and to the outer side of the nerve.

In the macular region was a sharply circumscribed, dark-red disk pyriform in shape, with the rounded extremity situated temporally, the long axis of the oval being directed slightly down and in. In its widest part it was rather wider than the nerve head, but in length it did not quite equal that of the disk. This area had a more or less mottled appearance, contained some pigment and yellowish deposits, but no visible choroidal vessels. It was surrounded by a grayish-white ring with an inner shelving margin, especially well marked temporally. In the lower outer portion of this zone there was a larger pigment clump which aided materially in the demonstration of parallactic deviation, the refractive difference between the base of the excavation and the surrounding retinal tissue being about one diopter.

The literature was briefly reviewed and comments made upon the results of pathological study, which showed in most cases, including traumatic and non-traumatic cases, a cystic degeneration of the retinal layers, the underlying lesion being a retinal edema. Fuchs believes the pathology is probably the same in most instances whether due to traumatism, vascular or toxic changes.

Dr. Zentmayer recalled two cases of hole at the macula which he had previously reported—one following a blow on the eye and the other apparently due to a sclerosis of a macular artery. The size of the lesion in Dr. Sautter's cases was exceptional.

Convenient Modification of the Loring Ophthalmoscope

Dr. George S. Crampton demonstrated a simple modification of the Loring ophthalmoscope which has proved a great convenience in routine ophthalmoscopic examinations, especially

in the hospital clinics. After the author had used it with pleasure for a couple of years he discovered that Dr. William Zentmayer had devised the same thing and had used it in his routine work for about eight years.

A strong plus lens of say 16 diopters replaces the minus one, and the other minus lenses are all moved around one position, the highest or minus eight being eliminated. This change can only be made in ophthalmoscopes in which the lenses are held between two disks which are fastened to one another by screws. The numbered disk is turned over and its plain side is engraved to correspond to the change. As all of the figures can be stamped with one blow of a die it would, no doubt, be more advantageous to purchase the new model than to bother having an old one engraved.

In use the examination is started with the plus sixteen in place, then, after examining the anterior media, the plus and minus lenses are brought into use without removing the ophthalmoscope from the eye. As the high plus lens passes by, it momentarily blurs the fundus details and one can easily tell with which lens he is working by remembering the number of changes he has made into the plus or minus. Thus the dial need not be read except occasionally. After a week's use one becomes accustomed to the change and would not return to the old type.

Dr. Zentmayer said that he had been led to make this modification in his ophthalmoscope because of the time consumed in taking the scope away from the eye in order to swing into place the quadrant bearing the +15 D. lens, which he invariably uses in examining the media. Where one has a large hospital service the time saved by the modification is considerable. He had placed it on the same side of the aperture as are the plus lenses because of the great preponderance of hyperopes. After examination of the media one passes on to the plus lenses.

OCTOBER 16

Angioid Streaks in the Retina Observed over a Period of Five Years

Dr. William Zentmayer presented a case of angioid streaks in the retina which he exhibited at a meeting of the Section five years ago. He thought it would be of interest to the Section at this time, as there were probably some present who had never had an opportunity of seeing this rare condition, and, further, as the course of the case might throw some light on the pathogenesis of these streaks, which at present is in doubt. So far as possible to judge by comparison of the fundi at the present time with the colored reproductions made five years ago, the only changes that have occurred are a complete absorption of the hemorrhage that was present in the macular region, an apparent increase in peripheral chorioretinitis, and a loss of transparence of the retina throughout, which has rendered the streaks less conspicuous. The streaks themselves show no alteration. Dr. Zentmayer does not accept the view that these streaks are the result of metamorphosed blood, but inclines to the belief that they are new-formed vessels.

Discussing Dr. Zentmayer's paper, Dr. de Schweinitz referred to the case records of two patients with angioid streaks in the retina that he had published, these patients being brothers, and to the fact that he had been able to keep one of the patients under observation for about a year without noting any decided change in the fundus lesions. An interesting appearance in the eye-ground was a large hemorrhagic area in the macular region from which a number of angioid streaks appeared to diverge, very much as streams might from a pond, and this had led him at the time to accept the theory that these angioid streaks might represent a metamorphosis of hemorrhages diffused in a linear manner through the deeper layers of the retina, as Ward Holden had suggested. He was not then acquainted with Lister's observations, which certainly represent a more satisfactory explanation of the condition.

Congenital Buphthalmos

Dr. William Zentmayer presented a case of congenital buphthalmos in a man, aged forty-seven years. He has had large eyes and poor vision since childhood. Fifteen years ago he was told that he had a dislocated lens in O. S., and three years ago the eye became blind. Dr. Sears, of Huntingdon, had been obliged to enucleate this eye six weeks ago, because of advanced glaucomatous changes. Twelve years ago a diagnosis of beginning cataract of O. D. was made and the V. finally became reduced to l. p. Sometime later vision was restored to this eye spontaneously and suddenly. There is now a high degree of hydrophthalmos. The iris is tremulous and no trace of the lens can be found. T. = 90 mm.; V. =20/30 pt. The field shows considerable contraction with a comma-shaped scotoma just below the horizontal meridian and to the outside of fixation. Rest in bed and the systematic use of miotics influenced T. but little. The subconjunctival injections of a 4 per cent. solution of citrate of soda brought the T. to 65 mm., but this was but temporary. The field, however, has broadened some and the scotoma has lifted. Dr. Zentmayer asked for suggestions as to treatment and as to the propriety of trephining. The case is exceptional in that useful vision has been retained in a hydrophthalmic eye for so long a period.

An Unusual Case of Congenital Squint

Dr. William Campbell Posey exhibited an unusual case of congenital squint. The deviations were most pronounced in the left eye, and pointed to insufficiency in the innervation of the external rectus and superior rectus muscles of that eye. There was marked overaction of the left inferior oblique when the eyes were directed toward the right.

Dr. Zentmayer: The failure of the left eye to rotate outward in consensual action while doing so fully when the right eye is

covered could be explained by the fact that the right eye is the fixing eye and in consensual action the left eye lags, whereas the left eye takes up fixation when the right eye is covered.

Case of Chronic Glaucoma Showing Results of the Elliot Operation

Dr. Posey also exhibited a man with chronic glaucoma, upon whom he had recently performed an Elliot trephining operation upon each eye, with an associated iridectomy in the right eye, but none in the left. The right anterior chamber had not re-formed three weeks after the operation. Dr. Posey said that Wallis, in a recent paper, had remarked that the anterior chamber is slow to reform after the trephining operation, in cases in which the chamber was shallow prior to the procedure.

Vertical Nystagmus with Cerebellar Symptoms and Symptoms of Disease of the Cervical Spinal Cord

Dr. Charles K. Mills presented a case of *vertical nystagmus with cerebellar symptoms and symptoms of disease of the cervical spinal cord.* This patient was a woman, aged twenty-eight years, and at the time of presentation an inmate of the wards for nervous diseases of the hospital of the University of Pennsylvania. Seven years before she had a severe fall backward, the result of slipping on the ice. She was not unconscious and was able to go to her home. She began to suffer from pains beginning in the suboccipital region and running down the right shoulder and arm to the finger-tips. The pain continued and increased in frequency. Several months after the beginning of the pain she began to have contractures in the second, third, and fourth fingers of the right hand. These contractures gradually became fixed. For about three years she had had numbness in the left hand. About three years before admission she began to become

uncertain in her gait, tottering from one side to the other. She could walk better with the use of her eyes, as in daylight. She is unable at present to walk alone and can barely stand without support. She has not suffered from headache. The nystagmus seems to have begun about four years ago, as the patient states that during this time everything she looked at appeared to be moving up and down.

Examination showed that the senses of taste, smell, and hearing were normal. The patient had a marked Romberg, tending to pitch backward and to the left. Her gait was both spastic and ataxic with a tending to the left. In walking the limbs were kept too far apart. Both upper extremities showed distinct loss of power, more marked on the right than the left, with atrophy of the muscles of the shoulder and some wasting irregularly distributed in the upper limbs. The right hand was held somewhat flexed and the patient was unable to extend the little, ring, and middle fingers. Hypermetry was present in the finger-to-nose test, although not marked. The condition as to adiadochokinesis could not be determined owing to the diminution in power in the hand and forearms. The lower extremities were decidedly spastic. Knee-jerks and ankle-jerks were exaggerated and the Babinski reflex was present on each side. Areas of impaired sensation were present in the upper trunk and arms, their exact distribution being difficult to determine.

Both upper lids showed slight drooping. The left palpebral fissure was about 1 mm. less than the right. The pupils reacted normally. Hemianopsia was absent as were also lesions of the fundus. Vertical nystagmus was present continuing with movements of the eyes in all directions and somewhat increased with movements to the right.

The patient had at one time some difficulty in swallowing, but this seemed to have disappeared. Both she and her friends said that she had been unable to laugh aloud for several years. Examination of the throat showed complete immobility of the left vocal cord.

The symptoms in this case, only a brief outline of which has

been given, show a probable lesion of the upper cervical cord. The vertical nystagmus may be due to the involvement of the restiform body or of one or more of the nuclei of the vestibular nerve or of the tracks connecting these nuclei with the labyrinth. One of the most interesting questions involved is that of the explanation of the limitation of the nystagmus to the vertical direction. The reporter believed that probably each semicircular canal, or at least each subdivision of the vestibular nerve, was represented by a separate nucleus and that nystagmus in one direction might be accounted for in some instances by suppression of the nerve apparatus for all movements but the one shown. As to the part played by the cerebellum in the production of the nystagmus, Dr. Mills believed that in the vast majority of instances, at least, nystagmus could not be regarded as a pure cerebellar symptom, although it is so often present in tumors and other lesions of the cerebellum. Some disorders of ocular movements, not strictly of the character of nystagmus, may, however, be caused by lesions of certain portions of the cerebellum; and if it is correct, as seems to have been demonstrated by some neurohistologists, that Bechterew's nucleus, Deiters' nucleus, and the triangular nucleus had connections with the deep nuclei of the cerebellum, lesions of these tracks and nuclei might cause nystagmus.

The Wassermann test in this case was negative, but the blood examination showed pronounced anemia.

Dr. de Schweinitz, discussing Dr. Mills' paper, referred to McKenzie's belief that in vestibular nystagmus two movements can be detected, a slow movement and a short twitch; therefore the movements are unlike the oscillations of ordinary nystagmus. A feature of this nystagmus, according to McKenzie, is an exaggeration of the oscillations when the eye is turned in the direction of the short movement, and a diminution of the oscillations when it is turned toward the slow movement. He also referred to the belief, expressed by Savineau, that nystagmus depends upon a lesion of the supranuclear centres, and to Mangold and Lehmenstein's observations that experimental unilateral nystagmus

in the contralateral eye can be produced by section of the pes pedunculi cerebri. Such a section divides the fibers running in the pes which are in union with the cerebellum.

Amaurotic Idiocy with Pseudoglioma

Dr. Frederich Krauss presented a one-year-old child, of Hebrew parentage, suffering from amaurotic idiocy with pseudoglioma. There was no history of family idiocy, and instead of the typical eye-ground the right eye presented abolition of the anterior chamber by adhesion of the iris to the clear cornea. The pupil was about 3 mm. in diameter and the lens clear. There was a strong yellowish reflex from the fundus directly behind the lens. In the left eye, the outer three-fourths of the cornea was hazy and the anterior chamber and iris were as in the other eye, with no view of the fundus possible. The tension in both eyes was extremely low.

Concerning Asthenopia Following Exposure to Bright Light

Dr. G. E. de Schweinitz, after a description of various types of photophthalmia, to use the term introduced by Mr. Parsons, recited the case histories of patients who, after exposure to various sources of bright light, and after the subsidence of the photophthalmic symptoms, had for long periods of time persistent asthenopia, characterized by violent headache, excited by any effort of accommodation or the least exposure to light.

Dr. de Schweinitz, in endeavoring to explain the symptoms in patients of this character, discussed the ocular effects of the prolonged action of ultraviolet, infra-red, and visible rays. The sources of light which were the exciting agents in these asthenopic symptoms had been in one case an open-hearth steel furnace, in another a powerful electric headlight, and in a

third the glare from wide stretches of desert sand. These cases were used as types, that is to say, they were typical of many of those which he had studied in similar circumstances. It seemed to him that if the ultraviolet rays were most to blame the symptoms were somewhat different than when the offending rays were the infra-red or visible rays, particularly in disturbances of the field of vision which exposure to the ultraviolet rays had created. He was aware, however, that the division was to a certain extent an artificial one, and he could not be sure that such a separation of the effects of the various rays could always be made. It did seem to him, however, that one important source of the pain arose from a disturbance of the function of the ciliary body which was long in subsiding, and while it lasted appeared to be responsible for the severe ciliary neuralgia and headache which followed when this muscle was contracted in the effort of accommodation.

In the treatment of these cases prolonged mydriasis was advocated, under the influence of which the irritability and the hyperemia of the ciliary region subsided, which enabled the examiner accurately and fully to correct any anomaly of refraction, and this correction and the insistence that the glasses should be constantly worn were important parts of the treatment, but apparently not entirely sufficient. Therefore he had tried the effect of various drugs, notably iodides and bromides, but thought that his best results had followed the persistent use of satisfactory preparations of cannabis indica.

Dr. Posey referred to the great interest attached to the paper and was particularly interested in his reference to a disorder of the ciliary muscle as the cause of pain in one of his series of cases. He thought the term "asthenopia" particularly appropriate to designate the train of symptoms evoked by the light strain. The asthenopia of ordinary light strain could be traced in most cases to a fatigue of the ciliary muscle, and it was a matter of clinical experience that the relief to the asthenopic symptoms was attained by the rest afforded that muscle by proper correcting lenses. He referred to the proposed joint meeting of the

Section with the local Society of Illuminating Engineers, and hoped that Dr. de Schweinitz would present his interesting and valuable views upon that occasion.

Striped Incipient Detachment of the Retina

Dr. George S. Crampton exhibited a robust Jewess, aged twenty-five years, who had been healthy except for ear trouble, both mastoids having been operated upon during the past ten years. The left ear was quite deaf and the right partially so. Her hearing has been more or less defective since twelve years of age. Both lacrimal ducts were probed eight years ago and recently the constriction has returned. The past six weeks she has complained of a variety of rather indefinite symptoms in connection with the left eye. There has been pain about the eye with a sensation as though the eye was being thrust forward. Actual measurements showed a proptosis of 4 mm. She also complained that the visual field of this eye has been variable and brighter on one side than the other. Perimetric tests showed a slight concentric contraction. Externally the eye appeared normal and excursion was free in all directions. The disk appeared normal, but in the surrounding central fundus there were areas of considerable extent where the retina appeared as though thrown into minute, generally parallel, vertical folds. As a rule mere grayish lines could be seen, but elsewhere the folds were sharp enough to carry the smaller vessels with them, giving them a sharply tortuous appearance. The fundus picture resembled Plate 52 in Lindsay Johnson's *Atlas,* except that in the present case the macula, instead of being excavated, was the seat of two or three small, yellowish-brown spots. *x*-ray was negative. The vision of this eye was 6/15 and that of the other 6/6.

(Note.—The condition proved to be due to sinus disease. See later report in same proceedings.)

Dr. Zentmayer said that through the courtesy of Dr. Crampton

he had had the opportunity to examine the patient. He thought the retinal condition not unlike that seen where a retrobulbar growth pressing upon the posterior surface of the eyeball produces a hyperopic refraction and throws the retina into delicate folds. The fact that in this case there is proptosis present would suggest this as a possible explanation.

Orbital Tumor Originating in Lacrimal Gland

Dr. George S. Crampton exhibited a woman, aged forty-nine years, who had always been apparently healthy until five months ago, when diplopia was noticed, and the following month the right eye became more prominent than the left and there was ptosis of the upper lid. Gradually the eye was thrust forward to the nasal side and downward until now the ptosis measures 10 mm. The cornea remains clear, the pupil active, and the fundus apparently normal. Free excursion, except outwardly, proves that there is but little if any involvement of the muscle cone. On raising the lid the apparently normal accessory gland comes forward, but the gland itself cannot be uncovered. A narrow, dense growth extends forward 5 mm. beneath the upper, outer orbital wall. This mass has never been tender or painful. The vision is reduced to 6/60 while that of the left eye is 6/6. As there were several small tumors in the scalp, and a larger one 3 c.m. in diameter in the right axilla, the latter was removed as a diagnostic aid, and proved to be a fibroma.

(Later Note.—The orbital tumor proved to be an adenocarcinoma originating in the lacrimal gland. See later report in same transactions.)

Dr. Zentmayer, speaking of the prognosis of growths originating in the lacrimal gland, said that many of them are cylindromas and give a comparatively benign prognosis for life, although often recurring *in situ*. He recalled a patient, first operated upon by Dr. Norris, some eighteen years ago, in which there had been three recurrences, but notwithstanding the patient was still living at the age of eighty years.

Paralysis of both External Rectus Muscles Due to Traumatism

Dr. J. B. Turner exhibited a man, aged seventeen years, who had a fracture at the base of the skull caused by being knocked down and trampled by horses attached to an ice wagon. On admission to the Methodist Hospital he was unconscious and bleeding from mouth, nose, and ears. The pupils reacted unequally. Eight days later he developed a paralysis of both external rectus muscles. The pupils became equal and reacted to light and convergence. Two months later the left external rectus had somewhat regained its action. The paralysis was evidently due to injury of the sixth nerves somewhere in their long course.

NOVEMBER 20

The Lighting of a Private Library

Professor Arthur J. Rowland assumed that the room be of moderate size, and lighted by electricity, and that it be used for reading and study only.

Upon entering such a room, either by day or night, one should feel that it has the atmosphere of study. An occupant should also find the room so arranged that his attention would be fully drawn to the work in hand. To this end the ceiling and upper walls of the room should be tinted tan or green or gray green. The bookcases fill the lower space except where fireplace and window areas come in. The color supplied by the book covers in the cases will serve every purpose in giving the room character and attractive colorings. The wood-work should be darker than the wall coverings. Whether lighted by daylight or artificial light a definite location must be automatically indicated which invites the reader where good light for reading may be secured. On the bookcases only enough light is required to see book titles and in a general way discover their contents.

Day Lighting. Light received from side windows is best, not only because house construction naturally leads to this, but because this light reaches the objects we want lighted, while diffuse light from the floor gives a soft and satisfactory general result. Although three square feet of window area will allow a certain quantity of light to enter a room, we always prefer this area to be open to outside light at the bottom of a window space and not at the top. For day lighting, therefore, no special suggestions need be made, except that it is desirable to have all the window space of the room at one place, so cross-lights will not make shadows. The open area below the window shades may be covered by thin white goods to diffuse the light. The centre at which reading is to be done must be near the windows, and all furniture must be placed with reference to this centre. When it is properly lighted, there will be sufficient diffused light to meet all requirements at the bookcases and throughout the room.

Night Lighting. In planning night lighting it must be remembered that no room in a house has absolutely fixed character. Provision must be made so that adequate light for any purpose can easily be secured if desired. Hence a central ceiling fixture outlet must be included in the wiring scheme. Two or three side bracket outlets should also be installed with plug receptacles on the same circuit directly below them in the baseboard. While in use as a library, the side bracket outlets would be covered and the plug connections extended out to supplementary receptacles in the bases of the bookcases. Through these outlets the artificial lighting is to be accomplished.

At the ceiling outlet indirect lighting should not be used, for it produces an effect like skylight lighting. Nor should a fixture be installed which gives the slightest excuse for placing a table under it. Four or five small frosted-bulb lamps, in a cast-bronze fixture, clustered close to the ceiling, giving twenty to twenty-five candle-power, will fill the room with enough general light to enable the book titles to be seen, while the sense of the presence of lights rather than of light will be absent. On looking up from

a brightly lighted page in a room thus lighted, a reader would not feel striking contrasts between the light on the page and that in the room. One-tenth of a foot candle on the books is enough for this general lighting.

At the centre, where reading is to be done, a table whose top is not over twenty-seven inches from the floor should be placed with a top not over twenty-four inches square. A table-lamp is placed on it, so that the lower edge of a twelve-inch shade would be forty-two inches from the floor. The light within it should be a 60-watt Mazda lamp with its axis vertical, set in a prismatic extensive shade, so that an illumination of between three and four foot candles is produced on a reading page at a natural distance from it. Over the glass shade place an art shade in keeping with the room furnishings. The table and light are planned so a reader cannot easily sit facing the light or place his book on the table; nor should the table be piled up with books: they are to be placed in racks around the table sides.

In order to provide facilities for reading at other places in the room, a floor portable may be used whose light is entirely local, or a lamp fastened to an easy chair in a proper position, so that no reflection may be received from the book page into the reader's eyes.

Dr. S. D. Risley: I am thoroughly in accord with the method of lighting which Dr. Rowland has brought before us. I know of nothing more distracting than to work in a brilliant circle of light in a dark room. The room should have enough of general illumination so that when you look up from the page you do not look into darkness. There is a physiological reason for this, in that in working at a near point the muscle of accommodation contracts, the moment the eye is turned away there is relaxation, and upon return to the point of work there is a sudden contraction of the pupil. This leads to fatigue of the oculomotor nucleus and to general fatigue. General illumination of the room with a special provision for the library desk is to my mind a very proper arrangement for a private library.

Personally, I prefer side lights. I have no serious objection

to the central illumination near the ceiling. A room looks better lighted from the side. The source of illumination should be indirect. There should be no exposed filaments. I do not like a frosted globe. One of the most desirable lights I have ever seen I saw this summer in the observation car on a Western railroad. The lights were side lights entirely concealed by an inverted porcelain cover. The strong electric lamp inside the white porcelain became the source of illumination with no suggestion of the lamp and gave the diffused light as suggested by Dr. Rowland. The windows should be concealed by a white fabric. This cuts off shadows, diffuses the light, and is much more satisfactory than if the light comes directly through the closed window.

Mr. Bond: I at first thought that the device of the chair with the light directly at the back was a desirable thing, but apparently the other people in the room would receive the glare. I should like to ask whether this has been tested practically and whether it gives the sense of being under a glare which results in a rise of temperature?

Mr. Stickney: The problem is like one I have in my own study. I have a flat-topped desk. Beside it I have a small file-case. On that I have a lamp made for use as a piano lamp. This arrangement keeps all direct illumination from the eye and projects the light on the desk top in such a direction that wherever I am looking the reflection does not reach my eyes. This gives a very satisfactory illumination.

As to the question of gas or electricity, I think that every practising illuminating engineer feels that if either is protected so that the diffusion is equal there is no difference. There is nothing to indicate that there is any difference in the effect on the eye. I think the trouble has arisen in the condemnation of electric light in that when people began to use it they considered it an expensive luxury, and considered that to utilize it all it was necessary to use it without diffusion. They, therefore, got a large amount of light at the expense of good diffusion.

Mr. Pick: It is a common expression we hear that a person can read more comfortably by gas light than by electric, and

more comfortably by oil than by either. The physiological reason for this is that until the advent of the Welsbach the electric light was the whitest light and affected the retina more disastrously than the others. Too white a light is tiresome to the eye.

Mr. Ely: In a practical working-out of these problems we are getting away from the drop-light over the desk. I should not hesitate to light a private library by indirect illumination. To get the same result as with the light close to the ceiling a circular disk is used. This gives a general diffusion and reduces the brilliancy at the source.

Dr. Hansell: I should like to ask Professor Rowland why he prefers the direct to the indirect lighting in his library? I use the latter in my own library to my entire satisfaction.

Dr. Rowland, closing: I believe we all agree that there are many things in connection with lighting in which personal preference is a factor. To the questions concerning gas or electric illumination being preferred, there is no answer because they are so surrounded by other conditions. So far as I know, there is nothing in the character of light or in the character of the source to discriminate between illumination by gas or electricity. The reason I took electric light for the subject of my paper is that it is a convenient thing to limit one's self to one particular kind of light.

In regard to the lighting of a large table, I think the method outlined by Mr. Stickney is the best possible one. With the light off to one side the illumination is directed from the person who is using it. Most people take too much light and seem to be unaware of the enormous flood of light coming down upon their work.

The question of the direct *versus* the indirect light never will be settled. There are many circumstances under which just as good effects are secured with one as with the other.

The main point which I tried to bring out is that any kind of light, direct or indirect, which starts from above with a strong light, I think is desirable only where the whole of the interior

must be lighted. Furthermore, I suggested that the ceilings and higher parts of the walls should be of dull tones, that we should have no reflection from them. In looking about the room one would not think of bright surfaces.

My criticism of the light for use at the bookcases is that it would seem as if the bookcases were the things to be lighted, whereas the thing to be lighted is the place where the person is going to work.

Many of the questions, I think, admit of no discussion and of no positive conclusions.

Test Card Illuminated by a Linear Filament Lamp

Dr. S. Lewis Ziegler exhibited a visual test-card illuminated by an O'Brien single filament (linear) tungsten lamp, with frosted front, that he considered gave the most even illumination of any lamp that he had so far tried. Below the test letters he had placed his Greek-cross muscle test and at the bottom a Wallace astigmatic chart. The stand had been constructed for him by Messrs. Wall & Ochs, and he had long considered it a most efficient and convenient office fixture.

The single filament lamp and the linotype lamp were very similar in their construction. Both were used to illuminate book stacks in the larger city libraries and had demonstrated their value for this purpose. He thought more emphasis should be put on the necessity of frosting the globes of all electric lamps used for reading lights and also for house illumination, especially where the human eye is exposed to the glare of the filament. In the same way incandescent gas lamps should be provided with diffusers of porcelain or frosted glass. Much ocular fatigue could thus be avoided. This principle is the basis of all the systems of indirect lighting which are now so much in vogue.

The Mercury Vapor Lamp and the Effect of Ultraviolet Rays on the Eye

Dr. George S. Crampton traced the history and development of various types of lamps the luminosity of which depends upon an electric arc passing through mercury vapor. The spectrum of this lamp is made up almost entirely of blue, green, and yellow rays the red rays being absent. Salts of various metals have been used in connection with the mercury to bring up the red values of the light, but these experiments have not as yet proved altogether satisfactory. When quartz tubing is used in the construction of the lamp instead of glass, thus making it possible to produce a light of marked intensity, abundant ultraviolet light is given off, which is not the case when the lamps are made of glass, which is largely impervious to rays of shorter wave length than 300μ. The quartz lamps, however, are always protected by an outer globe of glass.

On account of the monochromatic quality of the light it is readily focussed upon the retina, and as a result work requiring sharp vision can be done at a greater distance from the light source than it can when polychromatic lights are used.

In the examination of twenty-eight persons whose work entailed unusual exposure to the light from mercury vapor lamps, Williams failed to find any changes in the retina or nerve which could not be, more properly, attributed to other causes.

The effects of ultraviolet light upon the eye have been much studied of late, but, unfortunately, practically all of the work has led merely to qualitative results.

The studies of various observers were quoted as evidence of the fact that the cornea, lens, and, to lesser extent, the vitreous, form very effectual barriers to the progress of ultraviolet light on its way to the retina. The author placed layers of the cornea, lens, and vitreous from the eyes of sheep in two-inch cells of quartz and passed through them the rays from an iron arc rich in ultraviolet light. The layers of tissue corresponded in thickness to those of a human eye, and in the case of the lenses the

cell was packed with unbroken lenses and the spaces filled with lens substance which had been ground in a mortar.

The absorption of the ultraviolet light was roughly estimated by the degree of fluorescence of uranium nitrate crystals and other fluorescent substances placed in the light path beyond the cells, the luminous rays having previously been largely filtered out. The lens substance and, to a lesser extent, the corneæ showed a beautiful pale-blue fluorescence as the invisible rays were by them changed into rays of visible light of longer wave length.

A quantitative study of the action of light of various wave lengths upon the eye is being made by the author.

DECEMBER 18

An Unusual Case of Xerophthalmos

Dr. Edward A. Shumway demonstrated a case of marked xerophthalmos in a patient from the Philadelphia General Hospital who had suffered from trachoma for many years. The trachoma was of the papillary variety, with marked hypertrophy of the palpebral conjunctiva, and the lids had been rolled on several occasions. The bulbar conjunctiva was thickened and leathery in appearance, the cornea opaque, and, on holding the eyelids apart, the corneal surface dried almost instantly. At times the entire eyeball was covered with a thick white membrane, composed of epithelial cells, which was so tough that it could be pulled off in sheets, and so adherent that the underlying conjunctiva would bleed if it was detached roughly. At other times these cells would collect in masses the size of a lima bean beneath the upper lid in the cul-de-sac. Instillation of drops of castor oil improved the condition very materially, when the membrane formation was most pronounced. The usual treatment consisted in the use of a 5 per cent. solution of sulphate of copper in equal parts of glycerin and water, which had proved very efficacious in the cases of cicatricial trachoma in the hospital wards.

Congenital Atrophy of the Iris

Dr. William Zentmayer exhibited *a case of essential atrophy of the iris*. A woman, aged twenty-seven years, who was first seen at Wills Hospital, April 15, 1913. She stated that eleven months before she noticed that the dark part of the left eye was increasing in size. Five months ago she began to see double. There was no history of trauma or inflammation, but the eye became injected after prolonged near work. From full notes of the history from March, 1912, kindly furnished by Dr. Frank Fisher, the following abstract has been made. On March 19, 1912, the iris had the appearance of degeneration and thinning in spots. The pupil was egg-shaped with its point up and in; small fenestrum at extreme outer margin near base. In August the pupil was more ovoid and a second fenestrum had formed above the first described. In January, 1913, increase in size of all the holes and in size of the pupil. Refraction low Am.

When first seen by Dr. Zentmayer the pupil was oval, 7 x 4 mm., egg-shaped, point up and out, reaching to within 1.5 mm. of corneal margin. There are now a half-dozen fenestræ in the nasal part of the iris, extending from the ciliary border to the small circle. The pupil reacts to light. T. by palpation + (?). Through the fenestra the suspensory fibers can be seen and the fundus is normal. Low-H. The right eye is normal in all respects. By December, 1913, the entire nasal third of the iris had disappeared, except for the sphincter and a few connective-tissue strands stretched between the sphincter and the ciliary attachment; no diplopia. In the absence of trauma or inflammation a possible explanation of the cause is a sclerosis of the vessels of the iris, leading to atrophy of the stroma from loss of nutrition.

A Scleral Trephine with Revolving Top

Dr. George H. Cross (by invitation) described a trephine designed by him consisting of a two-inch handle of metal, pivoted at the top of which there is a small, freely revolving finger-rest

in the form of a shallow saucer-like disk to permit freedom of rotation and allow perfect control of the pressure and location of the instrument. Immediately below this the handle takes the form of a cone with apex upward. This conical portion can be held with ease, owing to the presence of three knurled rings upon its surface. An expansion chuck at the lower end of the instrument is designed to lock or release the blade or trephine on a half-turn of the handle, the chuck allowing the use of blades of various sizes.

This trephine can be revolved from above by means of the thumb and forefinger placed upon the cone, or it can be operated from the side by placing the forefinger upon the loose top and rotating the barrel with the thumb and second finger. By either method the operator has complete control of pressure and position as well as an unobstructed view of the field of operation.

An Improved Scleral Trephine

Dr. S. Lewis Ziegler presented a new scleral trephine, in which the handle was both corrugated and cross-hatched to prevent any possible slipping of the grip. The handle was bulbous at each end and contracted in the middle. It could thus be manipulated between the thumb and forefinger, like the Elliot instrument, without the danger of the fingers working off at the top. The trephine blade was attached to the handle by a solid shaft, it had a 2 mm. diameter, was about 5 mm. long, and had an ample perforation to facilitate cleansing. It was a simple little instrument that cost but one dollar, and because of its cheapness could be thrown away when dull.

The Elliot Operation in Glaucoma

Dr. S. Lewis Ziegler presented a case of glaucoma on which he had performed the Elliot operation of sclerocorneal trephining. The fistulization was good, the iridectomy was ample, and the

drainage had reduced the tonometric reading from 52 to 17 mm. of Hg. The vision and fields had correspondingly improved. In the other eye he had performed a simple iridectomy for purposes of comparison and so far the result seemed equally good.

He desired to call attention to the large amount of plastic exudate that had been thrown out by the cut iris in the trephined eye, but not in the other eye. There was no inflammatory reaction in either eye, and the only difference that he had noted was the delayed closure of the anterior chamber in the trephined eye. He had been impressed by a similar state of affairs in a double Lagrange operation he had performed last spring. A large amount of plastic exudate had been thrown off in the eye in which the anterior chamber had remained open, while the eye that had promptly closed was free from this complication. He could not explain this discrepancy.

Elliot Operation for Chronic Glaucoma

Dr. Edward A. Shumway demonstrated for Dr. de Schweinitz, a colored woman with chronic, non-congestive glaucoma, on whom a trephining operation had been performed. At the time of operation vision was only 1/35 in the eye and the field was contracted, particularly on the nasal side. The tension was 29 mm. by the Schiotz tonometer. An excellent filtering scar had been secured, and the characteristic local edema beneath the conjunctiva had been beautifully demonstrated by Col. Elliot at a recent clinic at the University Hospital.

Elliot Operation for Chronic Glaucoma

Dr. S. W. Marshall (by invitation) described two cases from the Wills Eye Hospital:

Case I.—A man, aged fifty-four years, whose blind right eye had recently been enucleated in another hospital for the pain due to glaucoma of four years' standing, entered the Wills Eye Hospital

complaining of pain in the other eye. This eye was first affected one year ago, at which time an iridectomy was performed. On admission, three months ago, the cornea was steamy and the conjunctiva much injected. The anterior chamber was shallow and the pupil, including the coloboma, almost filled with lymph. The tension was 94 mm., and there was finger vision at one foot. Two days later, following a posterior sclerotomy, the tension fell to 20 mm., only to steadily rise again to 57 mm. in the course of one month. An Elliot operation was then done, the anterior chamber reformed in eight days and the patient felt comfortable with a tension of 18 mm. On the fourteenth and sixteenth days the tension was 20 mm. and 23 mm., the vision remaining as on admission.

Case II.—Mrs. A. H., aged sixty-five years, with absolute glaucoma in her blind right eye, the other eye having a vision of 6/9. The tension of the right eye was 90 mm. and the left 23 mm., which was reduced in one day by a miotic to 64 mm. in the affected eye. A few days later Dr. Marshall performed an Elliot operation on the blind eye for the relief of pain, a full iridectomy being made through a 1½ mm. opening. Five days later she was discharged with a tension of 18 mm., the vision remaining unchanged. In two weeks she returned with a tension of 18 mm., having had no return of the pain since operation.

Elliot Operation in Glaucoma

Dr. George S. Crampton reported the histories of two cases of glaucoma upon whom he had performed the Elliot operation.

Case I.—A woman, aged fifty-one years, whose right eye, blinded several years ago by chronic glaucoma, had recently become painful. The other eye was normal and had a vision of 6/6. When first seen, five weeks before operation, the bulbar conjunctiva of the affected eye was coarsely injected, the cornea fairly clear and somewhat anesthetic, and the iris rather muddy. As the pupil, under the effects of a miotic, was very small, the

fundus could not be seen. The tension was 60 mm., while that of the seeing eye was 27 mm., the blood-pressure being 195 mm. The eye quieted down under treatment, but the tonometric measurements remained high to the time of operation. A typical Elliot operation was performed under cocain with a $1\frac{1}{2}$ mm. trephine. An iridectomy was made and the conjunctival flap was held with one suture and atropin was instilled. Recovery was uneventful; the tension, three days after operation, being 44 mm. with absolute comfort. One month after operation the tension was 22 mm., and there was a small but apparently efficient filtering cicatrix.

Case II.—A woman, aged sixty-three years, whose right eye, which had been blind for two years, was the seat of an acute exacerbation of a chronic glaucoma. There were neuralgic pains about the deeply injected eye and there was ptosis of the upper lid. The cornea was steamy, and the pupil, which was irregularly oval, failed to react to light. On account of its small size from miotics the fundus could not be seen. The other eye had good vision and was generally normal, except for the presence of marked arteriosclerosis. The tension of the right eye was 77 mm. and the left 20 mm. The effected eye quieted somewhat and an Elliot operation was performed, the technique being the same as in the other case. Immediately after the iridectomy a small hemorrhage was noted in the upper part of the anterior chamber. From day to day this appeared to be renewed above as it absorbed below, thus causing it to have a striate appearance. The tension gradually mounted from 38 mm. to 135 mm. and the pain returned. Enucleation was performed some weeks later.

Delayed Reformation of Anterior Chamber after Elliot Operation for Glaucoma

Dr. Howard F. Hansell exhibited a patient whose right eye was trephined one month ago. The anterior chamber remained annihilated and the iris in contact with the cornea for four weeks.

A slow iritis, with intense congestion of the ball, developed after his discharge from the hospital, necessitating his readmittance. No accident marred the operation, no unusual cause could be assigned for the extensive filtration and delayed formation of the anterior chamber. Vision before operation was 20/70; four weeks later it had declined to counting fingers at four feet.

Dr. S. D. Risley had been especially interested in one feature of Dr. Hansell's case. He had in two cases seen the anterior chamber remain empty long after the complete healing of the scleral section made for the iridectomy. In both cases it proved to be due to a disposal of the aqueous humor into the suprachoroidal space at the base of the coloboma. The condition disappeared after rest in bed and eserine locally.

The Elliot Operation in Congestive Glaucoma

Dr. William Zentmayer gave the notes in a case of congestive glaucoma operated upon by him after the Elliot method for Dr. Posey at the Wills Hospital. The patient was a middle-aged woman who had lost the left eye from absolute glaucoma. The right eye was congested, the cornea clear, anterior chamber shallow, T. 55 mm. The operation was uncomplicated, a small peripheral iridectomy being obtained. Except for a very slight iritis the healing was uneventful. Ten days later the eye was entirely quiet, T. 31 mm. One month later she wrote that her vision had improved and the eye was doing well. Dr. Zentmayer gave the notes of a similar case successfully operated upon by the same method by Dr. Posey.

Discussion on the Elliot Operation for Glaucoma

Dr. Howard Hansell: My experience in the performance and observation of the cases of the Elliot operation is limited to seven eyes. In three, persistent pain for weeks was a prominent symptom. In all the pain was relieved while the patients remained under observation. In none was the sight improved.

The dangers of the operation have not been fully appreciated, nor all the difficulties of its performance acknowledged. The latter are briefly: (1) to avoid button-holing the conjunctiva; (2) to make and remove a clean and perfect disk; (3) to avoid wounding the lens or capsule by driving the trephine into the anterior or posterior chambers.

The dangers are: (1) infection through the buttonholed conjunctiva; (2) iritis; (3) cataract from injury by the trephine, or continued contact of capsule and lens with the cornea; all three of which, it will be seen, are in addition to and different from the dangers of iridectomy.

Dr. Zentmayer: In very few of the operations that he had seen done was he convinced that either a splitting or a dissection of the corneal tissue was done. It seemed to him that what was accomplished was to separate the conjunctival extension from off the cornea at the limbus. He believed that to actually split the corneal tissue and push the trephine beneath this flap would result in the corneal portion of the trephine hole being covered by the anterior leaf of the split corneal tissue. This would be undesirable, as often in cutting through the hinge and the prolapsed iris at the same time as advised by Elliot the scleral part of the opening is left very small.

Sarcoma of the Choroid in the First Stage

Dr. G. Oram Ring referred to the gamma rays of radium and to the histogenous therapy of malignant disease as possibly modifying at a later period the present dictum of immediate excision of the eyeball.

The recent work of Roncali, Giordono, Fichera, Blumenthal, Lewin, and Pinkuss in the utilization of autolysates of normal and malignant tissue, the origin of melanin, and methods of diagnosis were considered. Reference was likewise made to various types of tension in the first stage of the disease.

The patient forming the basis of the discussion was a female, aged fifty-two years, with a negative family history, who had

never had any disabling illness. Some aching of left eye and impairment of vision had been noted for nearly a year. No history of traumatism was present.

Examination of O. D. was negative, that of O. S. as follows: Vision: fingers at ten inches. Eye looked almost normal in appearance; palpebral fissure 7 mm., as opposed to 5 mm. in the good eye. There was a very slight projection of the eyeball forward. The anterior ciliary veins were slightly increased in size. Pupillary reactions were not impaired. Tension was approximately normal. Cornea, lens, and vitreous were clear. Nerve, oval; long axis inclined with a scleral ring and broken choroidal crescent bounding it on the temporal margin. No gross changes were present in the nasal retina. Less than a disk's diameter from the nerve head the lower temporal retinal vessels curve forward, thus marking the beginning of a retinal detachment involving the region in and about the macula. There was an irregularity in the measurement of the retinal vessels from normal to $7\frac{1}{2}$ diopters at the summit of the detachment as it rose steeply into the vitreous. The summit was mottled and upon it a number of dilated capillaries could be detected. A definite scotoma was present. Careful observation of the case for several weeks with an increase in the summit of the detachment to 10 diopters suggested an enucleation which was performed.

Examination of excised eyeball showed a brownish-gray tumor 10 x 6 x 4 mm., situated in the choroid outward from a point 3 mm. from entrance of the nerve. Histological diagnosis, melanosarcoma of the choroid.

Dr. Zentmayer: Stress should be laid upon the important point mentioned by Dr. Ring of the danger of puncture of the globe for the purpose of diagnosis. A case in point occurred in his service at Wills Eye Hospital. A man, aged twenty-four years, with detachment of the retina, diagnosed as simple detachment, had a Deutschmann operation performed. Some months later the eye was enucleated by another surgeon for sarcoma of the choroid. After repeated recurrences in the orbit, for which Dr. Zentmayer operated, the patient died from metastasis to the

liver. He always felt that he may have been responsible for the orbital metastasis by reason of the puncture of the sclera.

Dr. S. D. Risley thanked Dr. Ring for the admirable presentation of a most interesting case. The difficulty of diagnosis where these malignant tumors are located in the posterior segment of the globe was well illustrated by Dr. Ring's case. He thought Dr. Ring should be congratulated in the verification of his careful deductions from the clinical study by the subsequent laboratory findings.

Dr. Ring, in closing, remarked that the patient remained up to the present in perfect health, although it was recognized that but eight months had elapsed since excision of the eyeball.

Adenocarcinoma of Lacrimal Gland

Dr. George S. Crampton reported the laboratory findings of a case of tumor of the orbit which he had previously shown before operation. The case was that of a woman, aged forty-nine years, who had been aware of a painless swelling over the right lacrimal gland for five months. The eye was gradually thrust forward, to the nasal side, and downward, the proptosis measuring 11 mm. (See first report for details.)

A curved incision was made along eyebrow from outer angle of eye to a point 2 cm. from nose. The tumor, which was attached to the orbital periosteum, extended from the involved gland to the superior orbital nerve, which it surrounded and which was removed with the growth, which also took with it a small area of conjunctiva about the ducts. The wound was closed with a subcuticular suture of silkworm gut. Considerable edema resulted, giving the lids the appearance of cellulitis, and infection was suspected, but the swelling promptly receded when the bandages were loosened and the wound healed by first intention. Ptosis and almost fixed eyeball resulted.

The tumor, preserved in formalin, measured 1.5 x 5 cm. On section it showed an arrangement of small collections of epithelial cells, some suggestion of glandular acini with central lumen,

others just dense collections. In these masses of epithelial cells and in the interstitial tissues are seen numerous small, round, and irregularly shaped cells with deeply staining nuclei. There is much degeneration of cells seen in centre of nodules. Mitotic figures are seen.

Incipient, Striped Detachment of the Retina Associated with Sinus Disease

Dr. George S. Crampton made a second report on a case previously shown before the Section, in which, associated with vague, distressing pains about the orbit of one eye of a woman, aged twenty-five years, there was a finely striated appearance of the central retina. Here and there the striæ were sufficiently raised to give the smaller vessels a corrugated appearance. No areas of definite detachment were seen. Under increasing doses of potassium iodide the fine ribs became flattened, but the symptoms did not subside until the ethmoids on the same side were evacuated by Dr. George M. Coates. On the removal of an enlarged turbinate and resection of the cell wall a large amount of pus was released, followed temporarily by edema of the lids and arrest of the annoying symptoms.

Dr. Zentmayer said he recalled that at the time the patient was previously shown that because of the presence of a very slight proptosis and the associated wrinkling of the retina he had suggested there might be an orbital condition to account for the symptoms. He would like to ask Dr. Crampton whether there was sufficient extension of the ethmoidal pressure into the orbit to thus explain the condition, or whether he looked upon the retinal folds or detachment as due to interference with venous circulation?

In reply Dr. Crampton stated that he was not prepared as yet to attempt to explain the mechanism by which the retina had been thrown into minute folds.

George S. Crampton,
Clerk.

APPENDIX

ANNUAL REPORT OF THE LIBRARY COMMITTEE FOR 1913

MR. PRESIDENT: In accordance with the ordinances and By-Laws of the College, I herewith submit the following report of the Library Committee for the year 1913:

Total number of volumes in the Library, including the bound volumes and 8,808 unbound "Reports" and "Transactions"	101,340
Number of unbound "Theses" and "Dissertations" .	11,227
Number of unbound pamphlets	78,580

Included in the above total there are 3,084 volumes known as "reserves," consisting of second copies of some of the more important periodical publications, and 3,044 volumes more or less incomplete.

The duplicates, which are not included in the above total, number 5,315.

The following table shows the number of volumes in the various divisions of the Library:

	Bound.	Incomplete and unbound.	Total.
General Library	72,184	2,997	75,181
Lewis Library	13,562	44	13,606
On permanent deposit:			
S. D. Gross Library . . .	3,525	3	3,528
Library of the Obstetrical Society of Philadelphia .	217	0	217
			92,532

The Library has received from all sources, during the past year, 5,391 volumes, 9,760 pamphlets, and 20,798 numbers of various periodicals. Of these, 642 volumes, 846 pamphlets, and 648 numbers of journals were received in exchange.

Accessions (including 43 volumes of "reserves"):	
General Library	3,322
Lewis Library	19
S. D. Gross Library	34
	3,375

The individual "donors" for the year ending November 1, 1913, number 504; this represents 982 distinct presentations. Each gift is duly acknowledged and properly recorded.

The following list shows the donations of twenty-five volumes or more, the number of volumes presented by the various publishing houses, and the gifts of the Philadelphia Pediatric Society:

	Volumes.
Dr. A. C. Wood	567
Dr. W. H. H. Githens	236
Dr. Louis Starr	177
Dr. S. Solis Cohen	148
Dr. A. A. Eshner	107
Dr. R. A. Cleeman	84
Dr. H. A. Hare	81
Dr. John B. Deaver	76
Dr. E. H. Siter	64
Dr. E. L. Duer	57
Dr. G. E. de Schweinitz	43
Dr. Francis R. Packard	39
Dr. John K. Mitchell	36
Dr. John B. Roberts	35
Dr. W. W. Keen	34
Dr. Charles K. Mills	33
Dr. James C. Wilson	33
Mrs. A. A. Bliss	33
Medical Library Association	32
Dr. S. Weir Mitchell	30

From the publishing houses of:

D. Appleton & Co.	3
P. Blakiston's Son & Co.	39
F. A. Davis Company	18
Lea & Febiger	10
Lemcke & Buechner	2

J. B. Lippincott Company	22
W. B. Saunders Company	47
William Wood & Co.	14
From the Philadelphia Pediatric Society:	6

The Library is indebted for large gifts of pamphlets and unbound periodicals to the following gentlemen:

Dr. A. P. C. Ashhurst	Dr. S. McC. Hamill	Dr. David Riesman
Dr. R. G. Beale	Dr. H. Amory Hare	Dr. A. C. Sautter
Dr. H. W. Cattell	Dr. F. P. Henry	Dr. G. E. de Schweinitz
Dr. Burton Chance	Dr. A. B. Hirsh	Dr. Louis Starr
Dr. Lida S. Cogill	Dr. W. W. Keen	Dr. C. F. Taylor
Dr. S. Solis Cohen	Dr. F. H. Klaer	Dr. William J. Taylor
Dr. E. P. Davis	Dr. R. G. LeConte	Dr. Joseph P. Tunis
Dr. C. W. Dulles	Dr. Morris J. Lewis	Dr. J. William White
Dr. A. A. Eshner	Dr. Edward Martin	Dr. James C. Wilson
Dr. C. B. Farr	Dr. C. K. Mills	Dr. C. S. Witherstine
Dr. Charles H. Frazier	Dr. John K. Mitchell	Dr. A. C. Wood
Dr. J. S. Gibb	Dr. S. Weir Mitchell	Dr. H. C. Wood
Dr. J. P. C. Griffith	Dr. Francis R. Packard	Dr. M. W. Zimmerman
	Dr. F. D. Patterson	

Also to Messrs. P. Blakiston's Son & Co., J. B. Lippincott Company, W. B. Saunders Company, John Wyeth & Brother, and Henry Phipps Institute.

930 new publications were added to the Library during the past year; 54 of these were written or edited by Fellows of the College.

31 volumes were presented by the following authors or editors:

Dr. J. M. Batten	Dr. F. P. Mall
Dr. Vincent Y. Bowditch	Dr. J. Ewing Mears
Dr. Irving Fisher	Dr. Jesse S. Myer
Dr. C. P. Franklin (editor)	Dr. Lewis S. Pilcher (editor)
Mr. Adolph Gering	Dr. G. K. Rebrin
Dr. H. H. Goddard	Dr. W. M. Sweet
Dr. Hobart Amory Hare	Dr. W. Wale
Dr. A. H. Hooker	Dr. A. S. Warthin
Dr. Rudolf von Jaksch	Dr. T. H. Weisenburg (editor)
Dr. S. Adolphus Knopf	Dr. Henry R. Wharton
Dr. Paul Lazarus	Dr. F. H. Williams
Dr. R. Lynch	Dr. R. N. Willson

28 volumes were sent by the publishers at the request of the following authors or editors:

Dr. J. M. Anders
Dr. H. W. Cattell (editor)
Dr. Edward P. Davis
Dr. John B. Deaver
Dr. Francis X. Dercum
Dr. W. A. Newman Dorland
Dr. Barton Cooke Hirst
Dr. W. W. Keen
Dr. Joseph McFarland
Dr. Milton K. Meyers (editor)
Dr. C. C. Norris
Dr. Francis R. Packard
Dr. R. S. Pitfield
Dr. C. S. Potts
Dr. Walter L. Pyle
Dr. C. E. de M. Sajous
Dr. G. E. de Schweinitz
Dr. Louis Starr
Dr. Francis T. Stewart
Dr. James K. Young

Summary of the "Funds":

	Volumes purchased.	Cost.
Henrietta Rush Fales Baker Fund	72	$207.09
Luther S. Bent Fund	31	64.00
William T. Carter Fund	73	172.16
Girardus Clarkson Fund	19	39.49
Francis X. Dercum Fund	59	202.30
John D. Griscom Fund	112	257.44
William F. Jenks Fund	91	283.14
Oliver A. Judson Fund	17	56.05
William V. and John M. Keating Fund	20	61.30
William W. Keen Fund	64	175.10
Library Endowment Fund	193	672.49
J. Ewing Mears Fund	28	95.81
Charles K. Mills Fund	3	5.42
Weir Mitchell Fund	67	214.19
John H. Musser Fund	6	12.56
Elizabeth K. Newcomet Fund	17	30.85
William F. Norris Fund	46	164.99
Charles A. Oliver Fund	...	.....
Philadelphia Medical Society Fund	5	13.46
Lewis Rodman Fund	45	178.54
Douglas Stockton Warren Fund	29	92.57
John F. Weightman Fund	12	48.86
Caspar Wistar Fund	72	185.12
	1,081	$3,232.93

Special Accounts:

	Volumes purchased.	Cost.	Volumes bound.	Cost.
Fund for completing files of journals	340	$760.85		
Fund for rare and valuable books	17	180.35		
Journal Association	26	45.70		
New Book Fund	26	80.90		
S. D. Gross Library Account	30	134.97	11	$11.15
	439	$1,202.77	11	$11.15

George B. Wood Fund for Library supplies, stationery, etc. Expended $338.21.

There were 1,907 volumes bound during the past year. This includes all new unbound books and current periodicals.

	1913.	1912.	Increase.
Number of visitors to the Library	8272	7329	943
Fellows of the College	3952	3029	923

The Library has been kept open two evenings each week and on the six minor legal holidays, for the same hours and period of time as during the preceding year:

	1913. (76 evenings)	1912. (80 evenings)	Increase.
Visitors, evening	573	545	28
Fellows of the College	204	199	5
Visitors, legal holidays	152	133	19
Fellows of the College	48	40	8

The above figures are included in the total number of visitors for the year.

	1913.	1912.	Increase.
Number of books consulted in Library	24,430	17,146	7,284

The number of books reported as "consulted in the Library" includes only those supplied by the Librarian or his assistants. Readers have access to the bound volumes kept on the shelves in the "Reading Room," and the Fellows of the College have access to the "book stacks." There are, therefore, a great many volumes consulted of which no accurate record can be kept.

	1913.	1912,	Increase.
Number of books taken out	4483	3758	725

	Works.	Volumes.	Cards written.
Cataloguing	1310	1470	15,421

All the books added to the shelves during the past year have been catalogued, and each volume accessioned and shelf-listed. 4,342 unbound pamphlets and reprints have been subject-headed and arranged alphabetically by subject, and by author under the subject.

Revision of catalogue: Number of cards revised, typewritten, examined, and alphabeted for the year ending November 1, 1913, 20,617.

The revision of the catalogue has been completed as far as the second series of the "Index-Catalogue" has been issued—"Testut"—and the work will be finished as rapidly as the remaining volumes of the alphabet appear. 2,963 shelf-list cards have been typewritten (in addition to the current work); 2,200 for the Lewis Library, and 763 for the S. D. Gross Library. This revision of the shelf-list should be completed during the coming year.

The current periodical publications, including "Transactions" and "Reports," received as issued, at this time, are obtained through the following sources:

	American.	Foreign.
Henrietta Rush Fales Baker Fund	0	13
William T. Carter Fund	2	12
Francis X. Dercum Fund	0	12
John D. Griscom Fund	2	34
Samuel D. Gross Library Account	0	3
William F. Jenks Fund	2	16
Journal Association	1	8
Oliver A. Judson Fund	0	7
William V. and John M. Keating Fund	0	7
William W. Keen fund	2	10
Library Endowment Fund	4	108
J. Ewing Mears Fund	0	2
Weir Mitchell Fund	1	29
Elizabeth K. Newcomet Fund	0	1
William F. Norris Fund	1	10
Philadelphia Medical Society Fund	0	7
Lewis Rodman Fund	0	13
John F. Weightman Fund	0	4
Caspar Wistar Fund	1	9
By Purchase, General Account	23	300
In Exchange	89	80
Editors	114	21
Publishers	46	1
Total	288	707
In addition, current numbers of periodicals are received at stated intervals through the courtesy of the editors and editorial staff of the following journals: American Journal of the Medical Sciences, Medical World, Therapeutic Gazette.	158	77
	446	784

Total number of current periodicals received at this date, 1,230.

New subscriptions added during the past year: American, 15; foreign, 63. Total, 78.

We exchange publications with the following schools of medicine:

University of	Amsterdam.	University of	Kiel.
"	Basel.	"	Königsberg.
"	Berlin.	"	Lausanne.
"	Bern.	"	Leiden.
"	Bonn.	"	Leipzig.
"	Breslau.	"	Lund.
"	Erlangen.	"	Marburg.
"	Geneva.	"	Rostock.
"	Giessen.	"	Strassburg.
"	Göttingen.	"	Upsala.
"	Griefswald.	"	Würzburg.
"	Halle Wittemberg.	"	Zurich.
"	Heidelberg.		
	Faculty of Medicine of		Bruxelles.
	"	"	Paris.
	"	"	Toulouse.
	"	"	Yucatan.

The University of Amsterdam (Universitiet van Amsterdam) has been added to the list during the past year.

1,104 Dissertations have been added to the Library during the past year, in addition to the Paris Theses, which are collected and bound by our agent in Paris, before being delivered.

We have received for the current year ending November 1, 1913, $290.53 in cash from the sale of duplicates.

We have an exchange, arranged on a cash basis, with two New York dealers, and have received during the past year forty volumes and one number of a journal, valued at $95.50.

During the year we have distributed duplicate books and periodicals on exchange account to the following:

Boston Medical Library Association.
Library of the Surgeon-General's Office.
University of Michigan General Library.
Vanderbilt University Department of Medicine Library.
Washington University Medical Library.

Returns have been received from the Boston Medical Library Association, Library of the Surgeon-General's Office, Vanderbilt University Department of Medicine Library, and the Washington University Medical Library. In addition, returns were received for exchanges sent prior to the present year, from the Lane Medical Library, San Francisco.

There has been one new departure in our efforts to dispose of the duplicates this year; cards have been written, covering more than a thousand volumes representing the history of medicine, special monographs, and books printed prior to 1800. These cards are to be sent to a dealer in Leipzig, who has expressed his willingness to make a bid for the books.

With the aid of exchanges, and by purchase from funds appropriated for the purpose by the Library Committee, we have, since November 1, 1912, completed our files of the following journals:

Archivio di medicina, chirurgia ed igiene. Roma.
Atti della Societa italiana di ostetricia e ginecologia. Roma.
Ergebnisse der Anatomie und Entwicklungsgeschichte. Wiesbaden.
Psychiatrische en neurologische Bladen. Amsterdam.
Revue de gynécologie et de chirurgie abdominale. Paris.
Rivista di patologia nervosa e mentale. Firenze.
Transactions of the American Microscopical Society.
Zeitschrift für Biologie. München.
Zeitschrift für diätetische und physikalische Therapie. Leipzig.
Zeitschrift für orthopädische Chirurgie. Stuttgart.

Amount of fines collected from November 1, 1912, to November 1, 1913, $16.25.

The following is a list of the rare medical books and works of special interest received during the past year:

Incunabula

(Total number of incunabula at this date, 174)

(Since the report of 1912, the Library Committee has removed from its list of Incunabula—Martin Pollich von Mellerstadt's Responsio. [Lipsiae, 1501.])

Albertus Magnus. De generatione et corruptione. Venetiis, Johannes et Gregorius de Gregoriis, 1495 (Presented by Dr. James C. Wilson.)

Albertus Magnus. Liber aggregationis seu secretorum de virtutibus herbarum. Auguste, Johannes Schauren, 1496. This work is quite rare, a copy being seldom offered for sale, and it is in an excellent state of preservation. (Presented by Drs. S. Weir Mitchell and James C. Wilson.)

Celsus, Aurelius Cornelius. De medicina libri octo. Florentiae, Nicolao [di Lorenzo], 1478. This is a superb copy of the first edition of this work. The suggestion of obtaining it for the Library was made by Sir William Osler to Dr. S. Weir Mitchell; and it was through the efforts of our President, Dr. James C. Wilson, that the necessary subscriptions were obtained for its purchase. (Presented by Drs. James M. Anders, Thomas G. Ashton, George Fales Baker, John G. Clark, John B. Deaver, Richard H. Harte, William W. Keen, S. Weir Mitchell, E. E. Montgomery, Sir William Osler, John B. Roberts, George E. de Schweinitz, James C. Wilson, S. Lewis Ziegler.)

Petrus Hispanus Pope John XXI. Practica medicinae quae thesaurus pauperum nuncupatur. Venecia, Giovanni Ragazzo & Giovanni Maria [da Occimiano], 1494. This is the first dated Italian edition of the most famous of the early popular works on domestic medicine. This edition appears never to have been seen by Hain, Copinger, Brunet, Jourdan, Choulant, Eberts, Panzer, and other bibliographers; and is not in the posession of the Library of the Surgeon-General's Office. It seems probable that it is the only copy in this country. (Presented by Dr. George E. de Schweinitz.)

Savonarola, Giovanni Michele. Opus medicinae, seu practica de aegritudinibus de capite usque ad pedes. Venetiis, Bonetus Locatellus for Octavianus Scotus, 1497. (Presented by Dr. Richard H. Harte.)

Works of Special Interest

Bacon, Francis. [Lord Verulam.] Historie of life and death. London, Okes, 1638. An excellent copy of a very rare edition. The "Bibliotheca Britannica" mentions one English edition of 1638, but without description; and Lowndes' "Bibliographers' Manual" gives an English edition of 1633 (which is, possibly, doubtful) and one of 1638, the description of which does not agree with this copy. The catalogues we were able to consult did not contain this edition. (Presented by Drs. James C. Wilson and S. Weir Mitchell.)

Bertholon, Nicolas. l'abbé. De l'électricité du corps humain. 2 vols. Paris, Croulbois, 1786. (Presented by Dr. George E. de Schweinitz.)

Cardanus, Hieronymus. Arcana politica. Lugduni Batav., Elzeviriana, 1635. (Presented by Dr. John K. Mitchell.)

Cardanus, Hieronymus. De rerum varietate libri xvii. Basilcae, Petri, 1557. [First edition.] (Fund for rare books.)

Casál, Gaspar. Historia natural y medica de le principado de Asturias. Madrid, Martin, 1762. This work contains the first printed account of pellagra, under the title of "Mal de Rosa." Francesco Frappoli, in 1771, published an account of a disease prevalent among the Milanese to which the name of pellagra was given, which is sometimes quoted as "the earliest account given of pellagra." (Presented by Dr. Joseph Sailer.)

Cheselden, William. Anatomy of the humane body. London, Cliff, 1713. [First edition.] (Fund for rare books.)

Culpeper, Nicholas. Pharmacopoeia Londinensis. London, Sawbridge, 1683. (Presented by Dr. George E. de Schweinitz.)

[Dallas, A. J.] Letter . . . relative to the late malignant fever. Philadelphia, Bradford, 1798. (Presented by Dr. George E. de Schweinitz.)

L'Ecole de Salerne. L'Art de conserver sa santé. Traduction en vers françois par B. L. M. Paris, 1766. (Presented by Dr. Francis R. Packard.)

Fabricius Hildanus, Guilielmus. Observationum et epistolarum chirurgico-medicarum. 2 vols. Argentorati, Beck, 1716–1717. (Fund for rare books.)

French, John. Art of distillation. London, Cotes, 1651. (Presented by Dr. S. W. Morton.)

Gerarde, John. Herball, or generall historie of plantes. London, Islip, 1636. The first edition of this work appeared in 1597. Copies of any edition are scarce and difficult to obtain. What is called "a fine portrait of Gerarde" is presented on the engraved title page. (Fund for rare books.)

Glaser, Christophorus. Traité de la chymie. Paris, 1663. (Fund for rare books.)

Harvey, William. Exercitatio anatomica de circulatione sanguinis. Ad Joannem Riolanum filium. Cantabrigae, Danielis, 1649. (Fund for rare books.)

Jenner, Edward. Further observations on the variolae vaccinae, or cow pox. London, Low, 1799. (Presented by Sir William Osler, Bart., M.D.)

de la Motte, [Guillaume Mauquest.] Traité des accouchements naturels. La Haye, Gosse, 1726. (Presented by Dr. J. C. Reeve.)

Leonicenus, Nicolas. De serpentibus opus singulare ac exactissimum. Bononiae Antonius de Benedictis, 1518. (Fund for rare books.)

Opera nova nelle quale ritrovareti molti bellisimi secreti novamente. n. p. n. pub. 1557. (Anonymously presented.)

Quercetanus, Josephus. Ad veritatem hermeticae medicinae ex Hippocratis veterumque decretis ac therapeusi. Francofurti, Richteri, 1605. (Fund for rare books.)

Riverius reformatus, or the Modern Riverius. London, Wellington, 1766. (Presented by Dr. Richard M. Pearce.)

de Robledo, D. A. Compendio cirurgico. Barcelona, Figuerò, 1702. (Presented by Dr. George E. de Schweinitz.)

Wedel, Georg Wolffgang. Theoria saporum medica. Jena, Krebs, 1703. (Fund for rare books.)

Manuscripts

Fothergill, Anthony. Copy of [his] will. [London, 1810.] (Presented by Sir William Osler, Bart., M.D.)

Haïraullah Effendi. [Medical manuscript in the Turkish language, 17—.] This manuscript, in the author's own handwriting, is the work of Haïraullah Effendi, the first of a celebrated line of Turkish physicians, and chief physician of his era, in the 12th Turkish century (18th century A.D.). (Presented by Dr. S. Weir Mitchell.)

Mettauer, J. P. [Manuscripts.] 3 vols. (Presented by Dr. George Ben Johnston.)

Norris, G. W. Record of all capital operations at the Pennsylvania Hospital [1836–1849.] (Presented by Dr. George W. Norris.)

Servetus Villanovanus, Michael. Christianismi restituto. Typewritten copy of the pages which relate to the circulation of the blood (pp. 169–172) of the 1553 edition. (Presented by Dr. S. Weir Mitchell.)

Other Interesting Accessions

Clay medical tablet, Assyrian, dating from the 7th century, B.C. This tablet is of an extremely rare type, bearing in cuneiform characters a series of prescriptions for stated ailments, accompanied by prayers or exorcisms appropriate to accompany the medicine. (Presented by Drs. S. Weir Mitchell and Richard H. Harte.)

Fuchs, Ernst. Photograph of a sketch. (Presented by Dr. George E. de Schweinitz.)

Harvey, William. Photograph of the statue of Harvey at his birthplace, Folkestone. (Presented by Dr. Alfred Hand, Jr.)

Jenner, Edward. Jenner's first inoculation with vaccine, May 14, 1796. A print of the painting by Gaston Mélingue, 1879. (Presented by Dr. George E. de Schweinitz.)

Morgan, John. Miniature. Silver cigar cutter belonging to John Morgan. (Presented by Miss Julia Morgan Harding.)

Reed, Walter. Portrait of Major Walter Reed. (Presented by Dr. A. C. Abbott.)

Trinity College, Dublin. Photograph of the interior of the library. (Presented by Dr. Richard H. Harte.)

Virchow, Rudolf Ludwig Karl. Photograph. (Presented by Dr. A. Bern Hirsh.)

Last year's report we spoke of as gratifying in many respects; the figures this year show a marked increase over those of 1912 in the number of readers (943), in the number of books consulted (7,284), and the number of books taken out (725); also that the use of the Library by the Fellows of the College has increased considerably (923). The evening hours show some increase in the number of visitors recorded, and the average attendance of the Fellows of the College is slightly higher than for the previous year ($2\frac{66}{100}$ against $2\frac{34}{100}$). The "study-rooms" have been in constant use throughout the year, the average number of volumes called for and retained in these rooms being about 105.

The increase shown in the number of volumes bound is principally the result of additions made in our subscriptions to periodical publications. The only special work has been the overhauling of our collection known as "Incunabula," repairs were made, when possible, and forty volumes were rebound.

There is a matter of sufficient interest to be mentioned which has not been included in the previous reports of the Library Committee—that is, the collection of protraits of medical men in the possession of the Library.

At the present time there are 1,451 loose portraits, including 448 of Fellows of the College, arranged in albums and a tray cabinet made especially for this purpose. This collection is irrespective of the paintings, framed engravings, and mounted portraits in printed books and in scrap-books. All portraits, however, are catalogued; and our cards, under the subject heading of "Portraits," show a record of 5,658 portraits to be found in the Library.

In the collection reported above there are 1,008 loose portraits of physicians and surgeons other than Fellows of the College, covering a period of time from Aesculapius to the end of the nineteenth century; a number of which are valuable engravings in "line," "stipple" and "mezzotint." This entire collection has been obtained by gift or in exchange.

The first effort to collect the protraits of the Fellows of the College seems to have been made sometime in the sixties, and resulted

in one album containing 178 "carte-de-visite" photographs. The second attempt was made by the present Librarian, commencing in the middle of the eighties and running on for a number of years, with a result of five albums containing 160 "cabinet" photographs. The outcome of the two attempts is a collection of portraits of Fellows of the College, valuable and interesting, but by no means complete.

The Library Committee have printed on the notices of the meetings of the College, sent to the Fellows, a request for their portraits. This notice has appeared, at intervals, for years—with a very meager response. It seems that in many cases the failure to respond is caused by a sense of modesty—modesty misplaced in this instance, however, as the request is made simply as a matter of historical interest.

The record for the past year is three photographs of Fellows of the College received.

During the past year the "Library Endowment Funds" have been increased by the Charles A. Oliver Memorial Fund, $806.14, by an additional $1,000 to the J. Ewing Mears Fund, and by an additional $500 from Dr. John B. Roberts for the "Catalogue Endowment Fund."

Total amount of Library Endowment Funds . .	$88,492.74
Income from Funds for the past year	3,807.59

Respectfully submitted,

William J. Taylor,
Chairman.

REPORT OF THE COMMITTEE ON THE MÜTTER MUSEUM, 1913

The Chairman of the Committee on Mütter Museum begs leave to offer the following report:

Your Committee points with pride to the increased use of the Museum during the past year.

The collections of the Museum have been frequently studied and photographed by Fellows of the College who have availed themselves of our specimens to illustrate various articles and text-books on different subjects connected with anatomy and pathology.

There have also been numerous visits to the Museum by the Fellows of the College, as well as by members of the profession and the laity residing in this commonwealth and in various parts of the United States and in foreign countries.

This result is largely owing to the increased facilities for study due to the rearranging and cataloguing of the collections.

The number of valuable specimens donated to the Museum have been duly reported to the College as have also the purchases made by the Committee during the current year. A series of frozen sections of the thorax are at present being prepared for the Museum.

The Committee wish to express their sorrow at the irreparable loss caused by the death of their late Chairman, Professor George McClellan, for many years their colleague. The zeal which he manifested for the welfare of the Museum has enabled your committee by following his policy to attain the results of the past year.

Mrs. George McClellan has notified us that she wishes to donate to the Museum a collection of ligamentous preparations which were originally the property of Professor Thomas D. Mütter and were afterward owned by the late Professor John H. Brinton who presented them to Professor McClellan.

She will also deposit in the Museum the entire anatomical and surgical preparations of her late husband. Your Committee requests that their attention be called to any specimen or collection which could be appropriately added to the Museum, either by donation or purchase.

The curator is present in the Museum daily from 12 to 1 P.M., and at such other times as Fellows of the College may request.

In conclusion the Committee would call the attention of the Fellows to the Lecture to be delivered by Robert C. Coffey, M.D., of Portland, Oregon, Mütter Lecture for 1913, on December 12, at 8.30 P.M., in Thomson Hall, on "Chronic Constipation Considered from the Embryological, Anatomical, and Experimental Stand-points." Illustrated by lantern slides and drawings to which a large attendance is expected.

Respectfully submitted,

HENRY MORRIS,
Chairman.

LIST OF PAPERS: SECTION ON OPHTHALMOLOGY

December, 1912

Exhibition of a Patient with Detachment of the Retina Probably Due to Sarcoma of the Choroid, by Dr. G. Oram Ring.

Exhibition of a Case of Multiple Ocular Palsies in Tabes, by Dr. Sydney L. Olsho (by invitation).

Report of a Case of Conical Cornea Successfully Treated by the Cautery, by Dr. William Campbell Posey.

Demonstration of a Case of Retained Pupillary Membrane and Fetal Iritis with the Zeiss Corneal Microscope, by Drs. G. E. de Schweinitz and T. B. Holloway.

Binasal Hemianopsia Occurring in the Course of Tabetic Optic Atrophy, by Drs. Charles R. Heed and George E. Price.

January, 1913

Exhibition of a Case of Cerebrospinal Syphilis with Multiple Ocular Palsies and Overaction of the Inferior Oblique Muscle of One Eye, by Dr. William Campbell Posey.

The Black Electric Perimiter and an Electric Ophthalmoscope with Translucent Color Test, exhibited by Dr. George S. Crampton.

Report of two Cases of Developmental Alexia, by Dr. Burton Chance.

Pseudoglioma with Microscopic Report, by Dr. Frederick Krauss.

Report of a Case of Diabetic Iritis, Retinitis, and Cataract, by Dr. William Zentmayer.

Exhibition of a Case of Ring Ulcer of the Cornea Associated with Antrum Disease, by Dr. Charles R. Heed.

Exhibition of a Case of Motais' Operation for Ptosis, by Dr. J. Hiland Dewey.

Exhibition of a Case of Retinitis Proliferans, by Dr. William Zentmayer.

February, 1913

Exhibition of a Case of Mucous Patch on Eyelid and a Case of Total Palsy of the Third Nerve, by Dr. C. E. G. Shannon.

Discussion of the Causes of Third Nerve Palsies, by Dr. William G. Spiller.

A Case of Ruptured Choroid Due to Gunshot Wound Exhibited by Dr. Frederick Krauss.

Exhibition of a Case of Glioma of the Retina, by Dr. George S. Crampton.

Choroideremia with Exhibition of two Cases, by Dr. Harold G. Goldberg.

Bilateral Congenital Aniridia, Ectopia Lentis and Pathological Cupping of the Disks, with Exhibition of the Patient, by Dr. T. B. Holloway.

Exhibition of a Case of Punctate Cataract, by Dr. T. B. Holloway.

A Case of Epidermolysis Bullosa and the Ocular Lesions, by Dr. G. E. de Schweinitz.

Concerning Dystrophy of the Corneal Epithelium with the Report of two Cases, by Dr. G. E. de Schweinitz.

Eye Injuries from Aniline with Report of Four Cases due to Aniline Pencils, by Dr. George S. Crampton.

March, 1913

Exhibition of two Cases of Excision of the Tarsus, for the Relief of Trachoma in the Third Stage, by Dr. Howard F. Hansell.

Exhibition of a Case having Cholesterin Crystals in the Anterior Chamber Following Repeated Discission of the Lens, by Dr. Edward A. Shumway.

Exhibition of two Cases of Congenital Punctate Cataract, by Dr. Thomas B. Holloway.

Exhibition of an Unusual Case of Posterior Cortical Cataract, by Dr. William Zentmayer.

Extensive Foreign Body Removed from Right Orbit, by Dr. G. Oram Ring.

Three Cases of Bilateral Non-traumatic Detachment of the Retina, by Dr. H. Maxwell Langdon.

Thiersch Grafts for the Treatment of Epithelioma, with Exhibition of the Patient, by Dr. McCluney Radcliffe.

Exhibition of a Case of Exudative Choroiditis treated with Mixed Culture Vaccine, by Dr. S. Lewis Ziegler.

History and Pathological Findings of a Case of Glioma of the Retina Exhibited Previous to Operation at Last Meeting, by Dr. George S. Crampton and Dr. Nelson M. Brinkerhoff (by invitation).

Phleboliths with the Report of a Case of Phlebolith of the Eyelid, by Dr. George S. Crampton.

April, 1913

Exhibition of a Case of Paralysis of Divergence by Dr. William Zentmayer.

Exhibition of a Case Showing Symmetrical Opacities in the Posterior Cortical, by Dr. William Zentmayer.

Exhibition of a Case of Thrombosis of a Sclerosed Retinal Artery Without Signs of General Arteriosclerosis, by Dr. H. Maxwell Langdon.

Exhibition of a Case of Thrombosis of a Retinal Artery in an Apparently Healthy Man, by Dr. H. Maxwell Langdon.

Exhibition of a Case of Macular Hole, by Dr. Albert C. Sautter.

A Convenient Modification of the Loring Ophthalmoscope, by Dr. George S. Crampton.

October, 1913

Exhibition of a Case of Angioid Streaks in the Retina Observed Over a Period of Five Years, by Dr. William Zentmayer.

A Case of Buphthalmos in a Man Forty-seven Years of Age, by Dr. William Zentmayer.

An Unusual Case of Congenital Squint, by Dr. William Campbell Posey.

A Case of Chronic Glaucoma Showing Results of Elliot Operation, by Dr. William Campbell Posey.

A Case of Vertical Nystagmus with Cerebellar Symptoms and Symptoms of Disease of the Cervical Spinal Cord, by Dr. Charles K. Mills.

A Case of Amaurotic Family Idiocy with Psuedoglioma, by Frederick Krauss.

Concerning Asthenopia Following Exposure to Bright Light, by Dr. G. E. de Schweinitz.

A Case of Orbital Tumor Probably Originating in the Lacrimal Gland, by Dr. George S. Crampton.

A Case of Striped, Incipient Detachment of the Retina, by Dr. George S. Crampton.

A Case of Paralysis of both External Rectus Muscles due to Traumatism, by Dr. J. B. Turner.

November, 1913 (Combined Meeting)

The Lighting of a Private Library, by Professor Arthur J. Rowland.

Demonstration of a Test Card Illuminated by a Linear Filament Lamp, by Dr. S. Lewis Ziegler.

The Mercury Vapor Lamp, with Remarks upon the Effects of Ultra-Violet Light upon the Eye.

GEORGE S. CRAMPTON,
Clerk.

LIST OF PAPERS: SECTION ON OTOLOGY AND LARYNGOLOGY

December 18, 1912

Report of Two Cases of Ethmoido-orbital Disease, one a Mucocele, the Other an Abscess, by Dr. Charles P. Grayson.

Nasal Endotheliomata, with Report of a Special Case. Presentation of patient, by Dr. James A. Babbitt.

Hypertrophied Tonsils Interfering with the Action of the Palate and Causing Defective Speech. Exhibition of patient, by Dr. C. Hudson Makuen.

January 15, 1913

The Use of Quinine and Urea as a Local Anesthetic in one Hundred and Four Cases of Tonsillectomy. Presentation of patients, by Dr. Louis J. Burns (by invitation).

Report of an Arrested Case of Advanced Laryngeal Tuberculosis; Tracheotomy Tube Worn for Five Years. Presentation of patient by Dr. George Fetterolf.

Submucous Resection of the Nasal Septum in the Reclining Position, by Dr. William R. Butt.

February 19, 1913

Report of a Case in which a Partial Set of Teeth was Removed from the Esophagus with the Aid of the Esophagoscope, by Dr. D. Braden Kyle.

Report of a Case of Sarcoma of the Tonsil with Operation and Recovery, by Dr. E. B. Gleason.

Remarks on Deflections of the Nasal Septum in Relation to the Symptoms and Choice of Operation, by Dr. A. W. Watson.

Paraffin Nasal Bridge Building. Technique and report of cases, by Dr. E. L. Vansant.

March 19, 1913

Treatment of Suppuration of the Antrum of Highmore. Exhibition of a new instrument, by Dr. E. B. Gleason.

(1) Report of an Unusual Case of Mastoiditis with Operation; (2) A Suggestion for the Reduction of Hypertrophy of Inferior Turbinates, by Dr. George B. Wood.

(1) Report of a Case in which Deafness Followed an Injection of Salvarsan; (2) Report of an Unusual Case of Mastoid Caries, by Dr. A. Spencer Kauffman (by invitation).

April 16, 1913

Presentation of a Case of Brain Abscess. Report of Two Cases of Naso-Pharyngeal Polyp in Young Persons Mistaken and Operated upon for Adenoids, by Dr. S. MacCuen Smith and Dr. William R. Butt.

Report of a Fatal Case of Brain Abscess Complicating Acute Mastoiditis. Exhibition of specimen, by Dr. C. C. Eves.

May 21, 1913

Multiple Papillomas of the Vocal Cords; Operation by Direct Laryngoscopy. Exhibition of two cases, by Dr. Nathan P. Stauffer.

The Severe Forms of Vincent's Angina. This Winter's Epidemic of Acute Mastoiditis case reports, by Dr. Charles P. Grayson and Dr. George M. Coates.

October 15, 1913

Unusual Bullet Wound of the Larynx. Demonstration of patient, by Dr. Walter Roberts.

Indications for and Results of the Submucous Resection of the Nasal Sputum. Exhibition of patient and specimen, by Dr. Mames Babbitt.

Occlusion by Ring Exostosis of the Auditory Canal. Etiology. Report of a Case, by Dr. George Morley Marshall.

November 19, 1913

Report of a Case of Encephalic Cystic Degeneration Complicating an Otitic Infection, with Operatoin. Presentation of patient, by Dr. D. B. Parish and Dr. George P. Muller.

Lupus of the Auricle. Presentation of patient, by Dr. Klopp. (By invitation.)

Ralph Butler,
Clerk.

LIST OF PAPERS: SECTION ON GENERAL MEDICINE

December, 1912

The Frequency of Pulmonary Involvement in Cases of Suspected Pleural Fibrosis, by Dr. Charles M. Montgomery.

Insufficiency of the Pulmonary Valve (with report of two cases), by Dr. Herman S. Allyn. (1) A Case of Tubercular Meningitis in an Adult with Recovery, and (2) Report of a Case of Gastro-enterostomy for Pylorospasm and Dilated Stomach, by Dr. Robert L. Pittfield.

Report of a Case of Ascites due to Cirrhosis of the Liver, Cured after Thirty-six Tappings, by Dr. David Riesman.

Myomas of the Stomach with Report of a Case Terminating Fatally by Hemorrhage, by Dr. C. B. Farr and Dr. R. A. Glenn.

January, 1913

A Consideration of Certain Clinical Types of Arthritis Deformans and their Management, by Dr. Robert B. Osgood, of Boston (by invitation).

Interpretation of the Malarial "Ring Form" Parasite, by Dr. Mary Rowley-Lawson, New London, (by invitation).

February, 1913

Two Cases of Poisoning in Brass-workers, by Dr. J. Norman Henry.

A Case of Recklinghausen's Disease, by Dr. Alfred Gordon.

The Treatment of Asthma, by Dr. M. H. Fussell.

A Case of Cat Asthma, by Dr. H. C. Wood, Jr.

A Clinical Study of Vagotonia, with Special Reference to Diagnosis and Treatment, by Dr. Arthur H. Hopkins.

A Probably New Sign in Exophthalmic Goiter, by Dr. David Riesman.

March, 1913

The Newer Concepts of Nephritis, by Dr. Richard M. Pearce.

Uremia, by Dr. A. E. Taylor.

The Treatment of Renal Dropsy, by Dr. Hobart A. Hare.

The Value of Edebohls' Treatment, by Dr. James Tyson and Dr. A. C. Wood.

April, 1913

The Treatment of Hyperchlorhydria, by Dr. A. A. Stevens.

A Case of Pellagra, by Dr. Joseph Sailer.

Antityphoid Vaccine during the Course of an Epidemic, by Dr. C. J. Hunt of the State Board of Health (by invitation).

The Value to the General Practitioner of Special Training in Pulmonary Disease, by Dr. Charles M. Montgomery.

May, 1913

Microscopic Lesions of the Bundle of His in a Case of Adams-Stokes Disease, by Dr. C. B. Farr and Dr. E. B. Krumbharr.

Some of the Non-surgical Methods Applicable in Exophthalmic Goitre, by Dr. S. Solis Cohen.

A Case of Leukemia Treated Unsuccessfully with Benzol, by Dr. Frederick P. Henry.

A Case of Acute Dilatation of the Stomach Complicating Pneumonia, by Dr. E. H. Goodman.

October, 1913

A Case of Traumatic Pneumothorax and its Relation to a Persisting Preceding Erythema Multiforme, by Dr. Norman B. Gwyn.

A Case of Hemothorax due to the Rupture of an Aneurysm into the Left Pleural Cavity, with Recovery, by Dr. E. H. Goodman.

The Treatment of Pneumonia at the Philadelphia Hospital, by Dr. Norman B. Gwyn.

A New Diagnostic Method for Lesions at the Pylorus, by Dr. P. G. Skillern, Jr.

Diet Social Service in Dispensary Work, by Dr. F. H. Klaer.

November, 1913

The Treatment of Acute Alcoholism, by Dr. R. S. Boles.

(1) A Case of Cirrhosis of the Liver with Recurring Fever, Epistaxis, and Erythema of Pharynx and Hands; (2) On Enlargements of the Supra-clavicular Gland, by Dr. Norman B. Gwyn.

Studies in Temperature in the Human Stomach during Digestion, by Dr. Alfred Stengel and Dr. A. H. Hopkins.

The Wassermann Reaction in Dispensary Practice, by Dr. E. B. Krumbhaar and Dr. C. M. Montgomery.

The Diagnostic Value of the Percutaneous Tuberculin Reaction, by Dr. E. B. Krumbhaar and Dr. John H. Musser, Jr.

C. B. Farr,
Clerk.

LIST OF PAPERS: SECTION ON MEDICAL HISTORY

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Asellius and the Discovery of the Lymphatic Circulation, by Dr. Frederick P. Henry.

Lantern Demonstration of the Illustrations of Early Treatise in Physiology, by Dr. Richard M. Pearce.

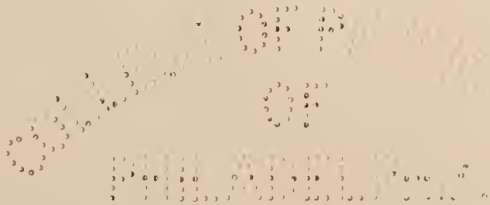
April 17, 1913

Aulus Cornelius Celsus and Some Remarks Concerning Rare Editions of Old Books and Medical Libraries, by Dr. J. C. Wilson.

Some Remarks on the History of Ophthalmology, by Dr. G. E. de Schweinitz.

The History of the Royal College of Physicians of London, by Dr. Thomas McCrae.

H. R. M. Landis,
Secretary.



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April 4, 1913. Professor H. P. Armsby.

PUBLIC LECTURES

February 17, 1913. Dr. John K. Mitchell.

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